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TABLE OF CONTENTS

VOLUME 10, 1956

No. 1, MARCH

The interaction of surface texture, outline gradient, and ground in the perception of slant: W. C. CLARK, A. H. SMITH, & AUSMA RABE 1
The influence of noun-adjective order on learning: WALLACE E. LAMBERT & ALLAN PAIVIO 9
Visual disturbances after prolonged perceptual isolation: WOODBURN HERON, B. K. DOANE, & T. H. SCOTT 13
Differential handling and weight gain in the albino rat: W. J. MCCLELLAND 19
Experimental investigation of behaviour in social situations: III. Behaviour under frustration: VLADIMIR CERVIN & J. D. KETCHUM 23
Stress and psychopathology in stutterers: JOHN W. LOVETT DOUST 31
Continuous affect recording: reliability and validity: JOHN PAUL 38
Abstract ability in schizophrenia and the organic psychoses: W. H. COONS 43
Administrative set and sex differences as factors in the negative self-concept score: EMORY L. COWEN 51
Book reviews 57

No. 2, JUNE

Effect of auditory flutter on the visual critical flicker frequency: JOHN C. OGILVIE 61
Individual differences in pain thresholds: JAMES W. CLARK & DALBIR BINDRA 69
Retinal gradients of outline distortion and binocular disparity as stimuli for slant: W. C. CLARK, A. H. SMITH, & AUSMA RABE 77
Effects of early experience on social behaviour: RONALD MELZACK & WILLIAM R. THOMPSON 82
Problem-seeking behaviour in rats: JAROSLAV HAVELKA 91
Some invariant properties of behaviour and the problem of metrics for social relations: VLADIMIR CERVIN 98
Psychological structure as the governing principle of projective technique: Rorschach theory: HERBERT DÖRKEN, JR. 101
A non-duplicating circuit for switching counter signals: LEONARD GELFAND 107
An automatic switch with variable "off" and "on" intervals: LEONARD GELFAND & R. SPENCER SOANES 109
Book reviews 115

No. 3, SEPTEMBER

On transfer and the abilities of man: GEORGE A. FERGUSON 121
Effect of glutamic acid on the learning ability of bright and dull rats: I. Administration during infancy: K. R. HUGHES & JOHN P. ZUBEK 132
Stimulation-maturation prediction of distribution phenomena in compensatory pursuit: M. K. DEY & R. B. AMMONS 139
Advantage of early over late perceptual experience in improving form discrimination: RONALD H. FORGUS 147

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EMG gradients and EEG amplitude during motivated listening: Alexander K. Bartoshuk 156
The distinction between "classical" and "instrumental": D. O. Hebb 165
Human motivation and Freud's theory of energy discharge: Joseph Nuttin 167
Cyclical variation in stuttering frequency and some related forms of variation: Bruce Quarrington 179
Book reviews 185

No. 4, December

SPECIAL ISSUE: DEFENCE RESEARCH STUDIES, II

Closure with negative after-images under flickering light: Craig M. Mooney 191
Effect of background on the critical flicker frequency: P. J. Foley 200
The interaction of auditory flutter and CFF: the effect of brightness: John C. Ogilvie 207
Gradients of outline convergence and distortion as stimuli for slant: A. H. Smith 211
Pacing and performance on a serial addition task: H. Sampson 219
Effect of anti-thyroid therapy on objective-test performance: Muriel H. Stern 226
Physiological gradients as indicants of "arousal" in mirror tracing: Robert B. Malmo & John F. Davis 231
Stimulus uncertainty, response uncertainty, and problem solving: F. Robert Brush 239
Optimal operating conditions for radar displays employing magnesium fluoride phosphors: A. A. Smith & G. E. Boyes 248

THE INTERACTION OF SURFACE TEXTURE, OUTLINE GRADIENT, AND GROUND IN THE PERCEPTION OF SLANT[1]

W. C. CLARK,[2] A. H. SMITH, AND AUSMA RABE[2]
Queen's University

IT has been argued (3) that the gradient or change in the density of units of surface texture projected on the retina by slanted objects is a sufficient stimulus for depth in the absence of other visual cues; also that the percept, the retinal gradient, and the orientation of the distal surface are in psychophysical correspondence. Such surface texture changes were shown experimentally to elicit veridical perception of slant by Gibson (4) for unslanted surfaces, and by Clark (1) for monocular vision when the surfaces were slanted. Clark and Smith (2) obtained similar results with slanted, textureless outline forms. These outcomes agree essentially with the earlier work of Metzger (7).

The level of operational analysis in these experiments did not provide a basis for evaluating the roles, singly and in combination, of relatively punctiform retinal stimulation provided by textured surfaces, of outline convergence, and of the background of the figure. Clark's (1) experiments are relevant, but not directly concerned with interaction, since outline and ground were generally held constant. Clark varied the size and separation of surface texture units and the duration of exposure. The non-linear relation between accuracy of perceiving slant and regular changes in these variables seemed to require the concept of "cohesion" (8) to account for the optimal perception for certain combinations of the variables. For example, when the size of the units was constant and their separation was varied 6, 30, and 90 mm., surface slant was perceived most accurately for the middle value. These results indicated the need for an exploratory study of the interaction effects of relatively simple stimulus situations and increasingly more complex ones formed by adding one variable at a time. It was also possible to design the experiment to provide a partial test of theory concerning the vexed problem of the relation between depth and shape.

[1]This is the third of a series of papers on the role of monocular retinal cues in the perception of slant. The earlier studies were reported by Clark (1) and in this journal (2). This study was supported by a grant from the Defence Research Board, Canada (Project DRB 370).

[2]Mr. Clark is now at the Vision Research Laboratory, University of Michigan. Miss Rabe is at the Department of Psychology, University of Michigan.

Procedure

The apparatus is described in detail elsewhere (1, 2). In brief, it consisted of a head-rest and an eyepiece permitting only monocular vision, a neutral grey reduction screen, 32.8 cm. from the observer, with a circular viewing aperture, 11.7 cm. in diameter, fitted with a shutter to conceal the stimuli between trials, and a homogeneous black background in the frontal-parallel plane 175 cm. from *O*'s eye. The stimuli, other than the two fields (see below), were exposed 12 cm. in front of the background and centred in the visual field. The *O*s recorded their judgments by moving a pointer on an ungraduated circular dial on the table in front of the head-rest. This was coupled with a graduated dial on *E*'s side of the reduction screen.

There were six stimulus conditions (Figure 1). Condition A, *film-field*, was produced by a sheet of wallboard, 88 × 113 cm., painted flat white. This appeared through the aperture as a field without an edge filling the visible area. Condition B, *surface-field*, was an arrangement like A except that the field was of dark blue cloth covered with white circular dots, 6 mm. in diameter with their centres 11 mm. apart. The reduction screen aperture for the two fields was 6 cm., rather than 11.7 cm., in diameter, placed so that the visible area was equal to that of the following rectangular forms. Condition C, *film-form, homogeneous ground*, was a white rectangle with a textureless surface against the black background. Condition D, *film-form, textured ground*, was a white rectangle against a background of green dots and horizontal lines on a black surface. The lines were 1 cm. wide, 4 cm. apart, and the dots 1.8 cm. in diameter, 7.5 cm. apart, centre to centre. Condition E, *surface-form, homogeneous ground*, was a rectangle, dotted like the field in B, against the black background. Condition F, *surface-form, textured ground*, was a rectangle, dotted as in E, against the ground as in D. The four rectangular forms were 28 × 15.4 cm. They were exposed with the long axis horizontal.

The illumination was indirect, centred behind *O*, and was decreased below the point at which there were any observable irregularities in the film-surfaces. Black cloth screens were used to make uniform the reflectance from the surfaces of the room and to eliminate gradients of illumination from the stimulus surfaces.

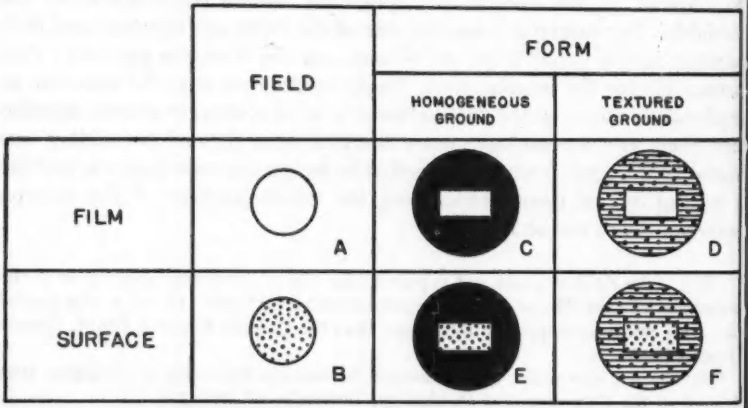

Figure 1. Diagram of the stimulus conditions.

The *O*s were twelve college students, each of whom viewed a different random order of the six conditions and made six judgments for each condition. The order was counterbalanced for a given *O*, for example, three in the order A, C, B, D, F, E, and three in the reverse order. The two fields and four forms were inclined 40° from the frontal-parallel plane with the left edge nearer to *O*. To prevent set formation, the angle was changed at random to one of 18 others, but these responses were not recorded. Trapezoidal forms were also presented randomly with the rectangles to prevent formation of a set for the shape of the latter. Judgments were recorded to the nearest degree. The index of accuracy of perception was the difference between objective and perceived slant. At the end of the session *O* was asked for a verbal judgment of the shape of the four slanted forms, which were then exposed once more, and also to draw in outline the shape of the figures as they appeared when exposed, i.e., disregarding any perceived slant. Ten *O*s each made one judgment and drawing of the four forms.

Criteria for Choice of the Variables

The experiment represents a partial attack on the persistent problem of constancy, within a theoretical framework which excluded both cognition and experience as explanatory concepts, and employing stimuli from which many of the common visual and non-visual cues for depth were absent. The object was to determine the relative accuracy of perception of slant for six stimulus conditions of varied complexity in terms of three major variables, surface texture, form or outline, and ground. The common explanation of constancy requires that the more cues there are in the objective situation the more will the percept conform to the "real" object rather than to the retinal image. If this holds for the slant of an object, accuracy of perceiving slant should be greater with the more complex stimuli.

Koffka's invariance hypothesis (6, pp. 228 ff.) represents an attempted explanation of a specific aspect of constancy. Changes in the accuracy of judging inclination are held to be accompanied by corresponding changes in the accuracy of judging shape. This implies that, if the slant of an object is underestimated, its perceived shape will regress toward its retinal shape. For example, if a rectangle inclined 40° is perceived as slanted much less, or as frontal-parallel, its perceived shape should be trapezoidal; and the more accurately slant is perceived, the more closely should the perceived shape correspond to the geometric shape. Graham (5, p. 875) concluded that research has generally failed to confirm the hypothesis. However, Gibson (3, pp. 170–173) holds that the hypothesis is consistent with perception of shape and slant on the basis of retinal gradients; also that, when these are operative, there is no need to invoke "knowledge of the object" to make perception more accurate. A partial test of the hypothesis may be made in terms of the relative accuracy of perception of the slant and shape of textured and textureless forms.

Hitherto the centre of interest has been the relation between the perceived shape and slant of textured and of outline forms. The role of ground has been somewhat neglected, despite its demonstrated importance within Gestalt theory. Most of the possibilities of variation involving ground have not been studied, consequently the following suggestions are tentative. The contrast between a stimulus form, film-colour or textured, and a homogeneous ground is likely to be greater than if the ground were textured, and thus to accentuate the contour. When the ground is textured and the form is a film-form, or a form with a texture different from that of the ground, the regular arrangement of the units of the ground may serve as a scale of reference for changes in the shape of the form. In both cases, more accurate

perception of slant would be expected. When the textures of the ground and surface of the figure are similar, the enclosed area may assimilate with the ground, and the accuracy of perceiving slant if the ground is frontal-parallel will be decreased.

The significant comparisons in the light of the foregoing are as follows: A and B, A and C, for the isolated effects of texture and outline gradient, respectively; B and E, for the interaction of outline gradient and texture of form; C and D, E and F, for the isolated effects of ground on the perceived slant of a film-form and a surface-form, respectively; C and E, D and F, for the isolated effects of texture on the perceived slant of the form in the presence of a homogeneous and of a textured ground, respectively.

Results

The mean perceived slants were much less than the objective slant (Table I). The textureless field A, in effect a control condition, was judged to be flat. The presence of texture in the field (B) produced a significant mean perception of slant, as did the presentation of the outline form on a homogeneous ground (C) (Table II). The significant increase in accuracy of perceiving the outline form on homogeneous ground was due to the addition of outline rather than texture. The differences between A and C and between B and E were significant; that between C and E was insignificant. The form in E contained about the same number of texture

TABLE I

Mean Perceived Slant

Stimulus condition	A	B	C	D	E	F
Mean perceived slant (degrees)	.67	9.07	13.78	11.75	15.43	10.51

Note. The stimulus slant was 40°. Each mean is based on 72 observations.

TABLE II

Significance of Mean Difference between Perceived Slant for Selected Pairs of Stimulus Conditions ($df = 11$)

Comparison	t ratio	P value
A–B	6.32	.005
A–C	6.69	.005
B–E	2.78	.025
C–D	1.90	>.100
C–E	1.18	>.100
D–F	1.00	>.100
E–F	3.06	.025

units as the field in B. The effect of adding texture to the ground decreased the accuracy of perception, significantly in the case of the textured form (comparison E–F) and insignificantly in the case of the film-form (comparison C–D).

Since the *t* ratio for the difference between the data for conditions C and D was insignificant, variance analysis was used for an additional comparison of the overall effects of outline and surface-forms. This showed that film-form produced more accurate and less variable percepts than surface-form. The *F* ratio of the pooled variance for conditions E and F (86.63) to that for conditions C and D (52.48) was 1.651 which, for 71 degrees of freedom, is significant between the one and five per cent levels. The lack of significance in the differences between the mean judgments for C and E, and D and F, together with the results for outline, shows that retinal gradient of texture compression and of outline did not jointly produce more accurate perception than outline alone, whether the ground was homogeneous or textured. Since D and F were the most complex conditions, sheer multiplicity of cues did not improve perception.

In the verbal judgments of apparent shape, all *O*s claimed to see a rectangle (distal stimulus) rather than a trapezium (apparent shape, proximal stimulus, or retinal image) or any compromise between the two, although they had been shown trapezia during the experiment and were led by the instructions to expect them. The task of drawing the apparent shape of the stimulus form, disregarding slant, is obviously a difficult one, probably subject to individual differences in ability to draw and in understanding the requirement. The drawings were of somewhat irregular shapes and sizes. The index of departure from rectangularity in the drawings was the ratio of the vertical side projected by the farther side of the stimulus rectangle to that projected by the nearer side. A ratio of one indicates a rectangular retinal image, any other a trapezium. At 40° slant, the expected ratio, in terms of geometrical projection on the retina, is .89.[3] Three of the four mean ratios (Table III) conform quite closely to expectation, i.e., are trapezoidal and such as would have been produced by rectangles slanted a few degrees more than 40° about a central point 163 cm. from *O*, in other words, by rectangles with the "derived slants." Except for condition D, for which the drawn shape is more trapezoidal, they are probably alike, but their differences were not tested for significance because of the small number of judgments. The differences between the perceived and derived slants are surprisingly large in view

[3]Computed as follows: the relative size of the image of an edge was 15.4 × 163 divided by the distance of the edge from the *O*; the ratio was the relative size of the image of the right edge divided by that of the left edge.

TABLE III

SHAPE JUDGMENTS FOR THE FORM CONDITIONS ($N = 10$)

	Stimulus condition			
	C	D	E	F
Mean ratio for drawn shape	.86	.76	.88	.87
Mean derived slant (degrees)	52.5	> 90	42.5	45
Mean perceived slant (degrees)	13.02	11.95	14.13	10.27

of the fact that the former represent judgments of actual slant and the latter judgments of the shape of the retinal images on which these percepts were based.

DISCUSSION

The results show that monocular perception of slant is in psychophysical correspondence with objective slant, and is mediated by such qualities of objects as surface texture and outline. However, aside from the results for the simpler conditions, A, B, and C, the view that object constancy is favoured by increasing the number of cues in the stimulus is apparently invalid, if "slant" may be substituted for "object." This was true for the addition of texture to form when the effect of textured or textureless ground was excluded (comparisons C–E and D–F). It is possible, of course, that stimuli slanted less than 40° are more ambiguous and that, in such cases, the addition of texture to form as in conditions E and F would provide a more effective cue. In the present situations, edge or outline was the more potent cue for slant when the factor of ground was excluded. The results agree with a previous finding (**2**) that percepts based on impoverished stimuli are not necessarily less stable than those based on complex stimuli.

The effect of ground is unclear. The suggestion that a textured ground would provide a reference scale for the convergence of form contour was not borne out. Its presence actually decreased the accuracy of perception. The results for conditions C and D are especially interesting in view of Metzger's similar finding, reported by Koffka (**6**, p. 124), that homogeneous film-forms tended to conform to the orientation of the homogeneous surround. The two situations differ in that Metzger's ground was microstructured rather than textured and that his stimulus forms, produced by differential illumination, were in the plane of the ground, actually a part of it.

The judgments of shape based on the drawings of condition D were excessively "trapezoidal," i.e., were such as would have been produced by a slanted trapezoid equal in area to the rectangle, or a more pro-

nounced trapezoid in the frontal-parallel plane. (A rectangle slanted 90° would of course yield a vertical line; however, the method is clearly subject to large inaccuracies.) Here the same ground as in condition F influenced perception of shape without affecting that of slant significantly. However, the shape percepts for condition F agree with the trend, and those for condition D would have been expected to be even more accurate, in view of the greater saliency of contour. Because of the possibility of assimilation of the texture of the figure to that of the ground in condition F, slant should also have been perceived more accurately for condition D. However, the mean difference between the two slants was insignificant.

The general results for the shape judgments, i.e. constancy for the rectangular shape between the distal and proximal stimuli but grossly inaccurate judgment of slant, are contrary to the invariance hypothesis. The ratios indicative of the shapes of the retinal images show that the retinal correlates for percepts of slightly more than 40° slant could be appreciated by the *Os* but were not used effectively in judging slant. It seems that monocularly viewed stimulus shape is not a reliable cue for slant even though, in the case of these simple forms, it is for shape. The requirement that either more cues or more "meaning" be present to produce the invariant relationship is contrary to the spirit of Koffka's formulation.

With further reference to constancy, the results failed to support Gibson's prediction (3, pp. 171–173) that, since retinal gradient of texture compression provides a stimulus for slant it would make possible a more accurate perception of shape; but they also failed to accord with Graham's view (5, pp. 873–876) that there would be little or no constancy of shape in stimulus situations with very few parameters. All *Os* claimed to see a rectangle in the case of the film-form on homogeneous ground, where the only parameter was shape, and also in the cases of the textured form on both homogeneous and textured ground. The results for the drawings also suggest retinal images projected by a rectangle. The presence of texture in the form apparently did not affect the judgment of shape. In the previous experiments on this problem most of the parameters other than shape were removed, leaving little to which the typical result (flattening of the percept and loss in shape constancy) could be attributed other than impoverishment of the stimulus situation. But there must have been a ground in most of these situations, and typically one with a degree of microstructure or texture.

Summary

Twelve *Os* viewed monocularly six stimuli of varied complexity in terms of surface texture gradient, outline gradient, and ground. Judgments

of slant, objective shape, and perspective shape were made. Slant was found to be a function of the first two gradients, but the effects of ground were unclear owing to unidentified interaction with figure. Outline was a more effective cue than surface texture, but the two did not jointly produce better perception than either alone. The data on the relation between slant and shape failed to accord with the invariance hypothesis and with traditional views of the nature of constancy.

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THE INFLUENCE OF NOUN-ADJECTIVE ORDER ON LEARNING

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THE GENERAL THEORY of communication developed by Shannon (4) presents a model which may prove useful to psychologists studying linguistic phenomena. The model has received most attention to date in analyses of amounts of information transmitted through communication channels. The purpose of the present study is to compare experimentally the communicational efficiency of two codes which differ in their habitual ordering of signals. The possible importance of such code differences on information transmission has been alluded to by several psycholinguists (1, 2, 3).

If approached as a learning problem, a familiar syntactical difference (signal order) between the English and French languages (codes) can be compared for ease of learning (information transmission). In English, an adjective-noun order is generally observed (e.g. "the red, white, and blue flag"), while in French the order is usually reversed (e.g. *"le drapeau bleu, blanc, rouge"*). What are the behavioural implications of this difference? Does noun-adjective order affect fidelity of information transmission through a channel?

Using English words and English-speaking subjects, it was hypothesized that, in spite of habitual word order, the noun-adjective order would be learned more easily because the noun acts as a conceptual "peg" from which its modifiers can be hung.

METHOD AND PROCEDURE

Twenty English-speaking subjects, 11 women and 9 men, were used. Subjects memorized two different lists of words, each to a criterion of two errorless runs. The words were presented on a Ranschburg exposure apparatus and the subject was required to call out the word before it appeared (anticipation method).

Each subject was given the following instructions:

You are to memorize a list of twenty-eight words. The words will appear one at a time in this space, each for approximately two seconds. There will be a slightly longer pause after every fourth word—that is, the words are in groups of four. The first time will be a practice run. After the first run we will go through the list again; this time, and each time thereafter, you will try to tell me what the word will be *before* it appears. Don't wait until you think you know them all, but start immediately to call out any you feel you remember.

At no time was anything said about the nature of the words to be presented. A pause of approximately five minutes was allowed after one list had been learned before starting on the other. One practice run was allowed on each list.

TABLE I

NOUN-ADJECTIVE LISTS USED*

List A	List B
magician	actor
skilled	superb
impressive	expressive
subtle	emotional
accent	sensation
pronounced	intense
harsh	icy
artificial	lasting
athlete	dancer
speedy	artistic
agile	graceful
muscular	charming
maple	lettuce
stately	crisp
lofty	leafy
sturdy	nutritious
hermit	bachelor
bearded	bald
shabby	respectable
harmless	homely
melody	scenery
pleasing	colourful
vivid	cloudy
memorable	picturesque
scientist	burglar
eminent	clumsy
critical	sly
efficient	greedy

*The above lists are shown in the noun-adjective order. For the adjective-noun trials the nouns were placed at the ends of the word-groups instead of the beginnings.

The list words ranged in frequency of usage from ten to twenty occurrences per million, as determined by Thorndike and Lorge (5), with the mean frequency the same in both lists. Each list consisted of seven groups of four words (one noun and three relevant adjectives per group). The total number of letters in the two lists was approximately the same. The lists are presented in Table I.

The subjects learned one list in the adjective-noun (A-N) order, the other in the noun-adjective (N-A) order. To counteract any practice effects from the first

list to the second, and also any differences between lists which might favour differential learning, four different orders of presentation were used. A subject could start with either list and with the words in that list either in N-A or A-N order. Each possible order of presentation was used with an equal number of subjects.

Results and Discussion

The results shown in Table II clearly support the hypothesis that the noun-adjective order is learned more quickly and with less errors.

Table III shows the total number of errors at each position *within* the four-word groups of each list. Certain factors favouring the learning of the noun-adjective order appear.

TABLE II

Trials and Errors to Criterion for Noun-Adjective and Adjective-Noun Order

	N–A order mean	A–N order mean	*SD* of diff.	*t* ratio	*df*	Significance
Trials	16.65	22.0	7.25	3.30	19	.005
Errors	136.60	183.35	96.75	2.16	19	.025

TABLE III

Frequency of Errors at Each Position Within Groups of the Lists (N = Nouns, A = Adjectives)

Position	N–A order error frequency	Percentage of total errors	Position	A–N order error frequency	Percentage of total errors
N	714	26.13	A	1396	38.07
A	688	25.18	A	996	27.16
A	731	26.76	A	778	21.22
A	599	21.93	N	497	13.55
Total	2732	100.00		3667	100.00

(1) A disproportionately large number of errors are made with the first adjectives in the A-N order. (2) More errors are made with each adjective within the A-N groups (A_1, A_2, A_3) than with any adjective in the N-A groups. (3) There is an almost linear decrease in errors from the first adjective to the noun in the A-N groups, which is not apparent in the N-A order where errors are clustered around what would be chance distribution for each position.

Differences in the amount of interference involved would seem to account for the comparative difficulty with first adjectives over first nouns. The only interference to learning the noun comes from the nouns

of other groups, whereas for the adjective there is interference not only from other first adjectives, but also from the other adjectives within the same group.

Why are there more errors with second and third adjectives in the A-N list than in the N-A list? A_1 should act as a cue for A_2 and A_2 for A_3 as well in one list as in the other. Apparently the noun's position is crucial, for when it appears first it serves as a cue for *each* adjective, not only for the one immediately following. When the noun comes last in a group, however, it appears to facilitate the retention of adjectives differentially, depending on their nearness to the noun. The words are recognized as nouns or adjectives, and as being related in the groups. The relatedness of group members is determined by the noun; relatedness is high when the noun appears early and low when the noun appears late. In other terms, the adjectives are meaningfully associated with the noun concept, and when the associations are forward (N-A order) rather than backward (A-N order) the adjectives are more easily learned.

Note, however, that one pays a certain price for the over-all communicational efficiency of the noun-adjective order. The nouns in the N-A order are both relatively and absolutely more difficult to learn than are the nouns in the A-N order, and this difference is apparently due to the cue properties of the three preceding adjectives in the A-N order. When a noun is first in a group, the only cue possible is its position in the series of groups. The communicational disadvantage of being first in the group, however, is less detrimental for the noun than for the adjective.

Summary

Subjects learned two lists of noun-adjective word groups, the words in one list having a noun-adjective order, and the other, an adjective-noun order. The noun-adjective order was learned significantly more easily, this communicational advantage depending on the comparative ease of learning adjectives rather than nouns in the noun-adjective order.

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VISUAL DISTURBANCES AFTER PROLONGED PERCEPTUAL ISOLATION[1]

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THIS report has its origins in the studies by Bexton, Heron, and Scott (1) of the effects on behaviour of prolonged and drastic reduction in the variation of the sensory environment. These conditions produced impairment of intellectual ability and disturbance of motivation, both during and after the period of isolation. Pronounced hallucinatory activity (primarily visual) also occurred during isolation.

In addition, remarks made by the subjects on returning to a normal environment indicated some disturbance of visual perception. Comments such as "things looked curved," "near things looked large and far things looked small," and "things rushed at me," were typical. Since the vagueness of such statements made them difficult to interpret, we thought it advisable, before undertaking a systematic study of the visual effects of isolation, that we ourselves should serve as subjects. We hoped thereby to gain some inkling of what aspects of perception it might be most fruitful to investigate.

The disturbances in visual perception which were observed after six days in isolation were unexpectedly profound and prolonged, and were in general the same for all three observers. Since this was so, and since many of the effects did not appear amenable to quantitative study, the observations of the three experimenter-subjects are here reported.

METHOD

The experimental conditions have been previously described (1). Briefly, they were as follows: the subjects lay on a bed in a small cubicle 24 hours a day, being released during that time only for meals or to go to the toilet. They wore cotton gloves and cylindrical cardboard cuffs which covered the hands and forearms, thus limiting tactual perception. Auditory perception was reduced by the partially sound-proof cubicle, by the U-shaped foam-rubber pillow in which the subject's head was placed, and by the continuous hum of the air-conditioning unit and other apparatus. During the entire experimental session, including meal and toilet periods, the subjects wore translucent plastic goggles which prevented pattern vision. The cubicle, painted a medium grey inside, was lighted by a shielded 60-watt lamp, so that as long as the subject kept his eyes open he was presented with a lighted, fairly homogeneous visual field, bounded nasally and temporally by the dark frames of the goggles. It was possible for the subjects to detect some texture in the plastic.

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The observations which follow are taken from notes and recordings made during isolation, from recordings made while the observers were looking at the room immediately after the goggles were removed, and from diaries which were kept for several days after the isolation period.

Observations During Isolation

At first, although there was some impression of mistiness and depth, the visual field still seemed to have some surface qualities. By the third or fourth day, however, it became compellingly three-dimensional for one observer, and it seemed to him as if he were looking into a tunnel of fog.

All three observers reported hallucinatory activity after the first day. At first this tended to be "simple" in form (rows of dots, geometrical patterns, mosaics, etc.); later it became more "complex" (scenery, people, bizarre architecture, etc.). There was a considerable amount of movement in the hallucinations: landscapes might appear divided into strips which moved in opposite directions; parts of a scene, or entire scenes, might become inverted, and pivot slowly from side to side. At times this type of movement was unpleasant, and caused the observers to feel nausea. All three reported that their eyes became tired from trying to "focus" on the hallucinations. Particularly during the earlier stages of isolation, the "visual field" was often filled with a large number of identical small patterns or objects (such as geometrical forms, or plants, or animals); these were usually arranged in symmetrical rows.

Observations After Isolation

The effects, which were observed both monocularly and binocularly, may conveniently be summarized under five headings: (1) Apparent movement independent of movement by the observer. There was a fluctuation, drifting, or swirling of objects and surfaces in the visual field. (2) Apparent movement associated with head or eye movements of the observer. The position of objects would appear to change when head or eye movements occurred. (3) Distortions of shape. (4) Accentuation of after-images and perceptual lag. (5) Effects on the perception of colour, and contrast effects.

(1) *Apparent movement independent of movement by the observer.* When the goggles were removed there was a great deal of random movement, unsteadiness, or drifting, which for the first few minutes seemed to involve almost all of the visual field.

Observer A. "My first glimpse of him [an experimenter] he was a little short joker, then he suddenly got tall, then he closed up again, then he sort of stabilized. . . . The room didn't look like a house on stilts, or a little short, fat house, it was going out and in, up and down like a crazy-house. The wall bulged towards me and went back."

Observer B. "The whole room is undulating, swirling. . . . You were going all over the fool place at first. The floor is still doing it. The wall is waving all over the place—a horrifying sight, as a matter of fact. . . . The centre of that curtain over there—it just swirls downward, undulates and waves inside. . . . I find it difficult to keep my eyes open for any length of time, the visual field is in such a state of chaos. . . . Everything will settle down for a moment, then it will start to go all over the place."

Observer C. These immediate effects were less marked with this observer, though he did report some "weaving" and "jumping about" of objects in the peripheral visual field.

After these initial gross effects there was some stabilization. The region which was fixated then seemed relatively still, though the area immediately surrounding it was still apt to drift and become distorted. Even the area fixated might undergo changes with prolonged inspection.

Observer A. "When I fixate here, that box behind you moves, and when I was fixating there, there was something wrong with this thing, which seemed to be swinging out. . . . There is a serious limit to what is in focus. I'm focusing on the midpoint of that rod, and there's a very small area of the rod which is clear. The rest of it is fluctuating all the time. . . . Have you ever looked at the bottom of a stream after you have dropped a stone in? A shallow stream, and you can look down through the circles going out? The centre is still and clear, but the rest is all ripply. Well, that's exactly the impression that I get. Wherever I fixate is the centre of the circle, and the rest of the stuff is behind these ripples." This observer continued to notice such distortions for several hours. Objects such as an ash tray or a watch appeared to expand or contract if he looked at them for any length of time. The apparatus used in tests which required prolonged fixation underwent changes. For example, the circular apperture in the Critical Fusion Frequency (CFF) apparatus changed its shape, and the four legs of a cross used as fixation point on a screen kept altering their relative lengths.

Observers B and C reported similar effects. Observer C found that, even 24 hours after coming out of the cubicle, objects or faces might expand and contract, bulge or writhe, if he looked at them for any length of time; only the region of fixation remained stable. Reading was difficult, since the portion of the page which was not directly fixated seemed to drift. The persistence of the effects in his case might be due to the fact that he found it impossible to sleep for 24 hours after emerging from the cubicle.

(2) *Apparent movement associated with head or eye movements of the observer.* A type of movement which was somewhat different, but no less striking, might be termed loss of "position constancy."

When the observer moved his head or eyes, it seemed to him as if objects in the visual field were moving. Typically, when he turned his eyes away from an object it appeared to move closer, while the object towards which his eyes were turned would retreat. In other words, an object seemed closer in peripheral vision than when it was directly fixated. When the observer approached or withdrew from objects in the visual field, it seemed as if the objects themselves were moving towards or

away from him. This was one of the more lasting effects, occurring with sudden movements of the observer several hours after the isolation period.

Observer A. "Things just don't stay put. For instance, I'm fixating down there, and out of the corner of my eye I see that upright; but when I fixate the upright, it jumps back. . . . There's no position constancy, that's what it is. As I move, it moves. When I move back and forth like this, I can't orientate against anything. . . . It's most peculiar, I feel as if I'm in a swing. . . . If I turn quickly or move back, it's not me that moves, it's this thing that moves."

Observer B. "Those things shift position every time I shift my gaze. As I move my eyes to the left, things in the right periphery come at me. Every time I move, everything in the room swirls and moves."

Observer C noticed for hours afterwards that, if he rocked back and forth while looking at a wall, it would appear to move towards him as his head went forward and away from him when his head moved back.

(3) *Distortions of shape.* Apart from the distortions in which movement was prominent, there was a tendency for straight edges or lines to appear curved, and for the region about the fixation point of flat surfaces to appear to bulge outwards. In addition, there were pronounced distortions of forms that occupied a large portion of the visual field. In some cases this seemed to be related to angular perspective, which appeared to be greatly exaggerated.

Observer A noticed that the curvature was most conspicuous in the case of those parts of vertical or horizontal lines or edges which were not directly fixated. As he ran his eyes along the line it would straighten out. When reading, about an hour after he had emerged, he found that the parts of the line which were not fixated seemed to curve upwards, but would fall into place when he fixated them. This observer noted that edges above and in the horizontal meridian appeared to be curving downwards, while those below the meridian seemed to curve upwards.

Observer B, glancing down at the floor-boards, observed that they seemed to sweep upwards from either side of the visual field into a mound or ridge which ran along the vertical meridian. When he fixated the midpoint between a pair of parallel vertical lines, the ends of the lines seemed to splay outwards. Horizontal lines above the horizontal meridian appeared to droop downwards at the ends.

Observer C reported effects similar to those of B. The curvature of vertical lines was particularly marked in his case, persisting for over 24 hours. Curvature appeared only after he had been fixating for some moments, and was greatest in the upper visual field.

(4) *After-images.* Observers A and C noticed pronounced negative after-images after looking at objects in the room and then at a blank wall. Both had difficulty with a CFF apparatus because of the after-images induced by the circular aperture. This had not occurred when they were tested before isolation.

Observer A reported a tendency for "perceptual lag" to occur when objects were moved across the visual field, part of the moving figure appearing to trail behind the rest. Thus, when a thin black line was rotated slowly against a dimly illuminated milk glass screen in a darkened room, the line seemed S-shaped because the ends "lagged" behind the centre part.

(5) *Colour and contrast effects.* Colours appeared bright, highly saturated or luminescent. Colour and brightness contrast was exaggerated, giving objects a glittering appearance. Black figures on a white background gave rise to subjective colours.

Observer A reported being disturbed by the brightness of some colours, and struck by the glistening appearance of objects. Surfaces gleamed as if they were wet. An experimenter's face appeared rosy and highly coloured.

Observer B noted that colours were dazzling, and was impressed by the wet, glistening appearance of the grain in a wooden surface. He reported that the experimenter's face appeared to be smeared with rouge. This tendency for people to appear rouged persisted for over 24 hours, as did the tendency for brightly coloured objects to seem luminous and highly saturated. A black square on a white background was surrounded by a blue and yellow iridescence.

Observer C reported that colour seemed brighter and more saturated than usual. Black figures on a white background were surrounded by blue and green patches. As in the case of the other observers, people appeared highly rouged.

Other observations. All three observers were nauseated by the perceptual disturbances during the first few minutes after they emerged from isolation. Observer B, in fact, became so dizzy that he thought he was going to faint, and had to close his eyes. This nausea resembled that produced by hallucinations during the isolation period, but was more pronounced. It should also be noted that some of the swirling and undulation in the visual field after the isolation period was similar to that which occurred while the subject was hallucinating.

Finally, there is some evidence that hallucinatory activity persists for some time after the subject has emerged from isolation. Observer C still experienced hallucinations when he closed his eyes half an hour later. When the goggles were replaced, he experienced them with his eyes open.

Comment

Since these preliminary observations were made, we have been carrying out a more systematic study of these effects. Though the data are not yet fully analysed, they seem to bear out the observations which we have reported, and to elaborate them somewhat. We have found, for instance, as regards the curvature of surfaces, that the surface may appear *either* convex or concave, and that the two conditions may alternate in the same

subject. This phenomenon may be related to changes in the apparent frontal-parallel plane, since measurements on recent subjects indicate that this is affected.

In addition, one of the causes of the apparent distortion of perspective is evidently a disturbance of size constancy. In an experimental situation in which a standard disc was presented 2 ft. in front of the subject and he was required to select a figure of the same size from a graduated row of discs 12 ft. in front of him, the experimental subjects consistently chose larger discs than did a comparable group of controls.

It is unlikely that the effects observed after isolation can be attributed merely to the forgetting of perceptual habits during the isolation period. They seem to resemble somewhat the effects reported after administration of certain drugs (such as mescal and lysergic acid) and after certain types of brain damage. When we consider as well the disturbances which occurred during isolation (e.g., vivid hallucinatory activity), it appears that exposing the subject to a monotonous sensory environment can cause disorganization of brain function similar to, and in some respects as great as, that produced by drugs or lesions.

That this is so is further indicated by changes in the subjects' EEGs during and after the isolation period. In eight subjects studied, slower frequencies appeared in the alpha band during isolation, and marked delta-wave activity developed. The EEG taken 3½ hours after the subject had emerged from the experimental conditions had still not returned to normal.

Summary

Three observers were kept in a monotonous sensory environment for six days. On returning to a normal environment, they experienced the following perceptual disturbances: (1) there was fluctuation, drifting and swirling of objects and surfaces in the visual field; (2) the position of objects appeared to change with head or eye movements; (3) shapes, lines, and edges appeared distorted; (4) after-images were accentuated; (5) colours seemed very bright and saturated, and there seemed to be an exaggeration of contrast phenomena.

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DIFFERENTIAL HANDLING AND WEIGHT GAIN IN THE ALBINO RAT[1]

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In recent studies by Weininger (1, 2, 3), and Weininger, McClelland, and Arima (4) concerning the effects of gentling on weight gain, it was argued that the tactile stimulation which the handled animals received during gentling was the crucial variable. If such stimulation in the form of gentling leads to increased body weight, other forms of handling albino rats, employing various degrees of such stimulation, should lead to different amounts of weight gain. The present investigation is concerned with the effects of different methods of handling albino rats during early life on their later body weight.

Procedure

Animals

Fifty male albino rats (Wistar strain), 21 days old were obtained from Carworth Farms, New York. Each animal was assigned to one of five groups of ten animals each, which were matched as closely as possible for mean weight (range 33.3 to 34.0 gm.) and housed in individual 12″ × 12″ × 12″ metal living cages. All cages were located in a well-lighted room with constant temperature and free from auditory or visual disturbance.

The animals were provided *ad libitum* with a diet of Purina Fox Chow cubes and water. In addition, each animal was fed small pieces of fresh green vegetable once a week.

Apparatus

The apparatus used was a 10″ × 5″ × 3″ wooden restraining box with a wire-mesh floor one inch from the bottom and a removable tray beneath to facilitate cleaning. Five removable galvanized iron partitions, each 1″ × ¾″ larger than the

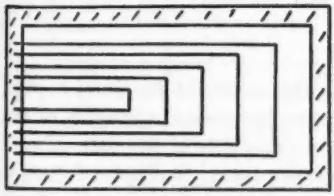

Figure 1. Interior of restraining box showing the five alternative compartments.

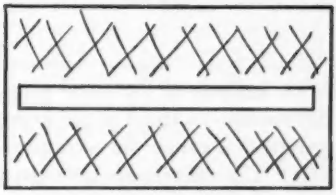

Figure 2. Lid of restraining box showing opening for stroking.

[1]This article is based on a thesis submitted in partial fulfilment of the requirements for the degree of Master of Arts at the University of Toronto, March 1955.

previous one, allowed the size of the restraining compartment to vary from 3″ × 1″ to 7″ × 3″ (Figure 1). The box was covered with a wire-mesh lid with an opening 8½″ long and having a width variable from ¾″ to 1″ (Figure 2). This opening was in the middle of the lid, centred directly above the restraining compartment whatever its size.

The size of the restraining compartment was selected to correspond with the size of the animal, leaving enough room for the animal to change direction. For those animals who received stroking while being restrained, a Windsor and Newton long-handled artist's brush (No. 10) with a ¾″ bristle was employed.

Experimental Conditions

All experimental treatments employed were carried out by a single experimenter in complete isolation. Since the differential handling of four experimental groups required 400 minutes each day, half of each group was treated at the same time each morning, and half at the same time each night. Each of the treated animals was subjected to one type of treatment for 10 minutes a day during 21 consecutive days, i.e., from 21 to 42 days of age.

Group A. Animals in this group were gentled using the procedure developed by Weininger (1). The animal was held in the left hand with the hand placed against the chest. The right thumb stroked the back of the animal from the head to the base of the tail, at the rate of approximately fifty strokes a minute. The animal was not held tightly and was allowed to move about in the hand.

Group B. Animals in this group were held in the restraining box and stroked from the head to the base of the tail at the rate of approximately fifty strokes a minute with the artist's brush. The animal was not restrained tightly and was allowed to change direction in the compartment.

Group C. Animals in this group were held in the experimenter's left hand in gentling position but received no stroking. The animal was not held tightly and was allowed to move about in the hand.

Group D. Animals in this group were held in the restraining box without receiving brush stroking.

Group E. Animals in this group served as controls. They were not handled in any way during the 21-day experimental period, but in all other respects were treated exactly like the other groups.

All animals received a minimum of unsystematic handling. They were weighed at 21 days, 42 days, and thereafter at three-day intervals until the age of 57 days.

Results

An analysis of variance[2] performed on the means at the forty-second day revealed a trend in the overall differences between the weights of the groups that cannot be accounted for by the variability of the data ($P=<.001$). The differences between groups are illustrated in Figure 3, and it appears that these weight curves increase in linear fashion, diverging constantly with the increasing age of the animals. Since this study was primarily concerned with the effects of differential handling on weight

[2]Details of the statistical operations are contained in the original thesis at the University of Toronto.

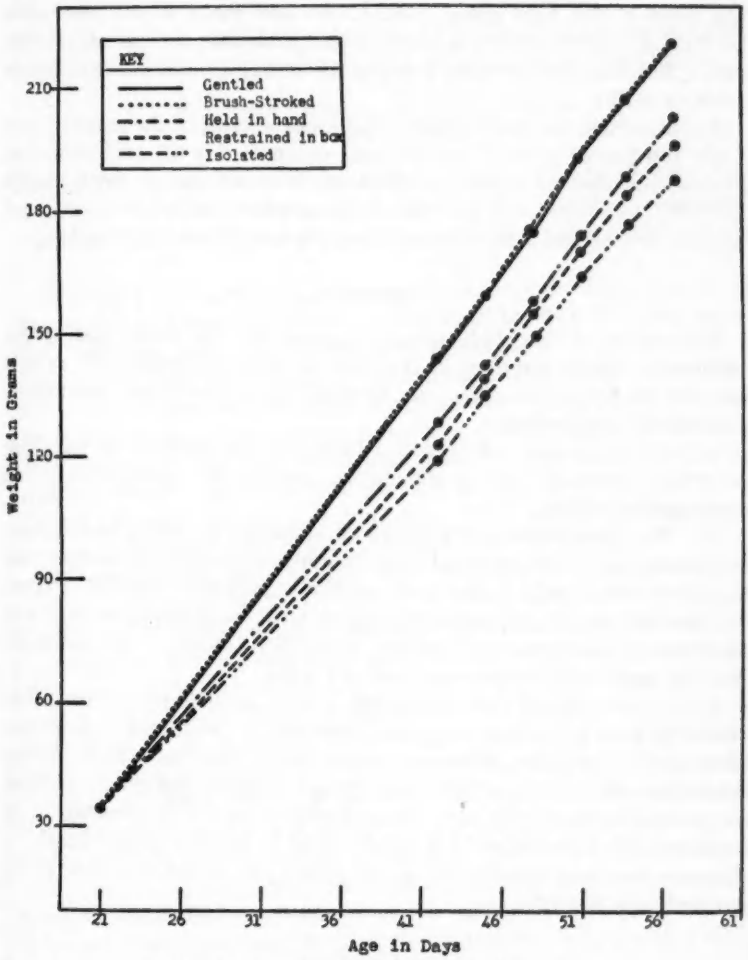

FIGURE 3. Average weight of rats in the five groups.

gain after termination of handling, formal statistical analysis was confined to the forty-second day of age.

The difference in mean weight between the gentled ($M = 142.9$) and brush-stroked ($M = 143.0$) groups is not statistically significant ($P > .80$). However, the difference between each of these groups and all other groups (C, D, E) is highly significant ($P < .001$). The difference between

the mean of the held group (M=127.0) and those of the restrained (M=121.4) and isolated (M=117.2) groups is also significant ($P<.05$ and $<.01$), but the difference between the restrained and isolated groups is not ($P<.20$).

A comparison was made between the mean weights of the morning and night sub-groups in each experimental group at day 42, and statistical analysis revealed no significant difference between any of these groups ($P>.20$). In other words, the time of day at which the handling occurred appears to have had little or no effect on the amount of weight gained.

Discussion

The results of this study provide support for the thesis that tactile stimulation during handling in early life contributes significantly to subsequent weight gain in albino rats. Confirmation of the thesis rests mainly on the following findings:

(*a*) Gentling, and stroking with a brush, the two methods of handling involving systematic tactile stimulation, resulted in approximately the same gain in weight.

(*b*) The three remaining methods of handling, involving less systematic tactile stimulation, resulted in significantly smaller gains in weight. The fact that animals held in the hand weighed significantly more than those restrained in the box or those completely isolated can possibly be explained in terms of the increased tactile stimulation received by increased random movement in the experimenter's hand.

It had been argued that the warmth caused by holding the animal in the hand during gentling was more important in producing weight gain than tactile stimulation. However, comparison of the brush-stroked group and either of the held or restrained groups suggests that this hypothesis is untenable. It appears that the systematic contact in gentling or in stroking with a brush, or to a lesser extent in holding in the hand, influences the body metabolism of the albino rat in the direction of increased body weight.

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EXPERIMENTAL INVESTIGATION OF BEHAVIOUR IN SOCIAL SITUATIONS: III. BEHAVIOUR UNDER FRUSTRATION[1]

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THIS paper reports three investigations of the differential effects of frustration on the performance of "emotionally unstable," "anxious," "psychopathic," and "normal" subjects,[2] working individually and in groups.

Frustration is regarded as a strong stimulus producing a secondary drive which increases the subject's motivational level (1, 2). At the same time, following Hull (5), the effort of solving a series of problems is expected to produce an increase in the inhibitory potential. Since there are no exact functions available, we could only predict that the total effective reaction potential under frustration should increase in the early trials, owing to increased motivation, but that the trend should be reversed after a certain number of trials, owing to the increasing inhibitory potential. When this would occur could not be predicted from our theory, but only from previous experiments.

The three personality variables were measured by preadministration of paper-and-pencil tests, and varied by taking subjects from the two extremes of the distributions of each test. Emotional instability was conceptualized as the high excitatory potential with which subjects enter the experiment, and was measured by a scale of emotional instability (3). Anxiety, regarded as a high general level of emotionality (4), was conceptualized as a secondary drive which generalizes to the reaction potential of whatever response is evoked by the situation. Psychopathic tendency, regarded as the negative end of the neuroticism dimension (4), was conceptualized as a low level of interference of generalized response tendencies (e.g., inner controls or defenses) with situationally relevant responses. This gives a higher net reaction potential for relevant responses to psychopathic than to non-psychopathic subjects. It was predicted that subjects in the above three categories (experimental Ss), having a higher level of reaction potential, would spend more time on frustrating tasks than those with lower reaction potentials (controls).

Thus, the predictions concerned: (*a*) the *trend* of development of performance under frustration for all subjects, and (*b*) the *differences* in level of performance throughout the experiment between subjects with

[1]Research done under National Health Grants, Project No. 605–5–124.

[2]Psychiatrically, all our subjects were normal. We use these labels only as convenient designations of the directions in which extreme scores varied from the means.

different personality scores. Predictions were similar for both individual and group performances.

To test these predictions, three experiments were conducted, all variations on the same theme: the first tested the performance of unstable and stable subjects in two frustrating trials; the second tested the performance of four categories of subjects—high- and low-anxious, and high- and low-psychopathic—under three successive frustrating trials, but with time limits on the second and third trials; the third tested the performance of homogeneous groups of three high- or low-anxious subjects in three successive trials with no time limits. Only the third experiment tested the hypothesis of the eventual decline in performance after repeated frustrating trials. In all three experiments subjects were first allowed to succeed in an easier task, similar to the test tasks.

Experiment I

Subjects

These were the same as in the previously reported experiments (3), except for those dropped because they solved the problems, and their matched counterparts. Thus a sample of 32 Ss was formed, 16 from each of the two extremes of the emotional instability scale described earlier (3). High-scoring Ss (mean 65) formed the experimental subsample, low-scoring ones (mean 28) the control. Matching produced no appreciable correlation in performance of the two categories of Ss (.12). We thus had an incidental sample taken from a hypothetical population of former, present, and future students, with a somewhat lower standing in mathematics than the total student population (owing to exclusion of Ss who solved their problems). This limitation on generalization does not impair the results of the study, since we are interested in relationships between social variables obtaining in any human population, not in the characteristics of a particular population (as, for instance, in attitude research).

Situation

Groups of three were formed, consisting of one S and two role-playing assistants, unknown to him, who posed as Ss. The task consisted of arithmetical problems, namely, finding the appropriate digits to correctly complete two two-digit numbers which, when multiplied, were to give a specified product. The assistants already knew the answers. The official instructions to the groups were: "You are required to work them [arithmetical problems] out individually. Work as quickly as possible. . . . We shall clock you for both individual and group performance" (motivational instructions). Members were instructed to ring the bell supplied to each as soon as they had completed a problem. Private instructions to assistants were: "Here your main task is to finish each problem before S does." This, and the difficulty of the problems, was intended to produce frustration, defined as failure after previous success. Other social variables were kept constant at zero level by instructing the assistants not to influence Ss in any way, and to keep quiet. Each S was given two means of terminating the situation, either by ringing the bell, if he thought he had solved the problem, or by asking the assistants for help. This they were instructed to give, but without disclosing the method of solution.

Performance Measures

All group members were clocked for the time taken to solve each problem or to ask for help. The difference between the time spent by S and that spent by the assistant who rang his bell last was called "time alone," and constituted the measure of S's effort under frustration. Reliability of measures was .94, as calculated from retiming of tape recordings.

Results

The hypothesis concerning the difference in effort between experimental and control subjects was not confirmed, although the differences were in the expected direction (Table I).

TABLE I

Mean Time (in seconds) which Subjects Spent Alone on Two Frustrating Tasks after the Bell (Experiment I) ($N = 32$)

Subjects	Task 1		Task 2		Probability
	Means	Variances	Means	Variances	
Experimental *Ss*					
Means	27.4		66.4		$<.01$
Variances		1,337		3,134	$>.025$
Control *Ss*					
Means	39.5		62.0		$<.01$
Variances		2,107		3,131	—

The hypothesis concerning the increase in effort after frustration was fully verified (Table I). As the variance in the second problem is larger than in the first (though not significantly), the nonparametric sign-test was applied to check the results of the analysis of variance. On this test the increase in time from the first to the second frustrating trial was significant at the .03 level, which confirms the previous result.

Experiment II

Subjects

About five hundred students in two psychology classes were screened by several tests. Of these only the Taylor Anxiety Scale and the *Pd* Scale from MMPI were retained, as measures of anxiety and psychopathic tendency (negative neuroticism), respectively, because they satisfied the requirement of low (.07) intercorrelation.[3] Students with scores at each end of these two dimensions were taken as Ss, certain very extreme cases being eliminated. All selected Ss were English-speaking and most were Canadians.The dividing scores between high and low categories on each test

[3]A Guttman-type scale for the whole dimension of neuroticism, i.e., both its positive and negative ends, is now being prepared on the basis of our data.

were the means of the total test distributions: Taylor 27, *Pd* 13. The design and scores are given in Table II.

Situation

The situation, task, and composition of groups were the same as in Experiment I, with two differences: (*a*) After the initial task, which Ss could complete, there followed three tasks which they could not, whereas one of the instructed assistants completed all three of them. (*b*) To increase their motivation, Ss were offered a choice between anagrams and arithmetical problems, and were given the type chosen.

Performance Measures

The same measurements were taken as in Experiment I. However, on the second and third frustrating tasks the experimenter terminated the trial when S had spent one minute more than he spent on the previous task, since our only interest was in whether an increase in time occurred.

TABLE II

EXPERIMENTAL DESIGN OF FRUSTRATION EXPERIMENT II, SHOWING MEAN TAYLOR AND *Pd* SCORES AND NUMBER OF SUBJECTS IN CELLS ($N = 48$)

	Anxiety			
	Low	High	Diff.	Mean *Pd* score
Psychopathic tendency				
Low	12	12		10.4
High	12	12		16.8
Diff.				6.4*
Mean Taylor score	19.4	34.9	15.5*	

*Significant at the .001 level (1 tail).

RESULTS

The hypotheses concerning the difference in levels of performance of the four groups of subjects were only partly confirmed. The main effects were in the expected direction (Table III), but not significant; simple

TABLE III

MEAN TIME (IN SECONDS) SPENT ON THE FIRST FRUSTRATING TASK AFTER THE BELL (EXPERIMENT II) ($N = 48$)

	Anxiety		
	Low	High	Diff.
Psychopathic tendency			
Low	285.1	524.5	239.4†
High	540.6	345.4	−195.2††
Diff.	255.5*	−179.1**	

*$t = 2.24$, $p < .025$ (1 tail)
**$t = 2.00$, $p \sim .03$ (1 tail)
†$t = 2.68$, $p < .01$ (1 tail)
††$t = 1.68$, $p \sim .06$ (1 tail)

effects of anxiety under low psychopathic tendency, and of psychopathic tendency under low anxiety, were significant at better than the .05 level of confidence. The opposite differences were not significant.

An interesting feature of the results is a very strong interaction effect, significant at better than the .01 level of confidence (F=9.01, df=1). Subjects in the high-anxiety, high-psychopathic cell were expected to have the highest performance scores of all, but did not behave according to expectation.

The hypotheses concerning the increase in performance level with frustration were confirmed. The time figures are not given, since time was controlled. The frequency of increases in effort with frustration was significant: only five subjects failed to show a consistent increase in time per task throughout the experiment, and four of them were in the high-anxiety, high-psychopathic cell. This may account for the low mean time of Ss in this cell (see Table III).

Experiment III

Subjects

From students of a third psychology class, screened for anxiety by the Taylor Scale, the extremes were taken as Ss, 18 from each end. The mean scores of these two categories were 20 and 35, with no overlap. Groups of three Ss were formed without assistants, each group having Ss from one extreme only. There were therefore six groups from each extreme. No matching was attempted, since previously used matching variables did not correlate with performance.

Situation

Tasks and instructions were the same as in Experiment II, except for differences due to the absence of assistants and of time limits. The Ss were allowed to succeed on the initial task, but forced to fail on three subsequent (very difficult) tasks. Each S was given the problems he wanted (anagrams or arithmetic). The experiment was limited to three frustrating tasks, pre-tests having indicated that this was sufficient to show the reversal of trend in effort. Performance was measured by how long Ss persisted in trying to solve each problem.

Results

Variability between groups was significantly larger than within groups ($F = 3.4$, $p < .01$), showing that groups tended to finish together. Hence all calculations are based on mean group times, not on individual performance. As may be seen from Figure 1, high-anxious Ss made a stronger effort than low-anxious Ss, except in trial 4, when their performance fell lower. Thus the difference was again in the expected direction, although not significant ($t = 1.06$ in trial 3).

The hypothesis concerning the development of effort under frustration was fully confirmed; the results have the predicted shape and are also

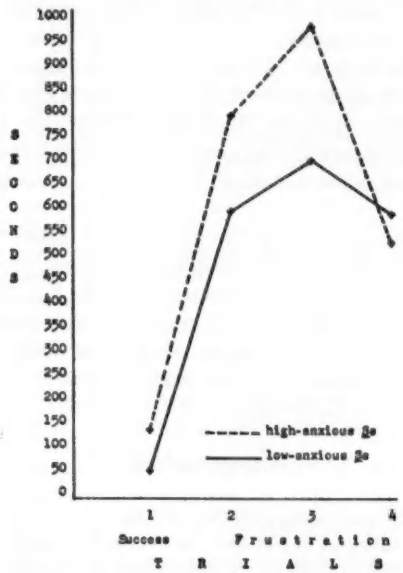

FIGURE 1. Mean time (in seconds) spent by groups of anxious and non-anxious subjects on four trials in Experiment III ($N = 36$).

TABLE IV

ANALYSIS OF VARIANCE FOR MEAN TIME SPENT BY GROUPS ON THREE FRUSTRATING TASKS (EXPERIMENT III) ($N = 36$)

Source	*df*	*MS*	*F*	*p*
Anxiety	1	173,751		
Trials	2	247,668	4.08	$<.05$
A × T	2	78,346		
Pooled interaction, groups × trials	20	60,063		
Between groups within anxiety categories	10	383,179		

significant (Figure 1 and Table IV). An interesting feature here is the wider swing of groups of high-anxious Ss both up and down (6). For high-anxious Ss the difference in means between trials 2 and 3 gave $t = 2.12$, and between trials 3 and 4, $t = 3.47$, whereas differences for low-anxious Ss were not significant.

OTHER RESULTS OF THE THREE EXPERIMENTS

Matching on sex, course year, and parents' income bracket was done only in the first experiment, since correlation between performance scores

of subjects in different categories was not significant. Nevertheless checks were made on influence of certain extraneous variables, notably sex and type of problems (anagrams and arithmetic). No significant difference between means of time spent on anagrams and on arithmetical problems was found, either in the second ($t = 1.25$) or the third experiment ($t = 1.63$).

The influence of sex was more pronounced. Females spent consistently more time on problems than males in all three experiments, and also in the two pre-trials. The differences were significant only in the third (group) experiment, although substantial in the second also: t was 1.17 in the first, 1.88 in the second, and 4.2 ($p < .01$) in the third experiment. Since the probability of successive occurrence of a difference in a series of five similar experiments is only about .03, it appears that females found the situation more frustrating than did males, especially the group situation. It should be noted that there was no significant difference between mean test scores of males and females (differences less than three scale points). Hence the difference in performance cannot be ascribed to a difference in mental health status, as measured by the tests used.

Discussion

Our data confirm the prediction that frustration should first increase the level of performance and then decrease it. However, the prediction of a higher level of performance for experimental subjects (assumed to have higher reaction potentials) was not confirmed in any single experiment, although all differences were in the expected direction. Since all experiments were similar and designed to measure the effect of the same variable, reaction potential, indirect evidence of the significance of differences is given by the probability, about .03, that such a series of differences would occur by chance five times in succession (in two pre-trials and three experiments). The validity of this evidence depends, of course, on the degree of similarity between the experiments.

We are led to conclude, therefore, that the effects of frustration vary with its extent and with the personality characteristics of frustrated subjects. The effects appear more pronounced in group than in individual situations, but evidence from our experiments is insufficient to support a conclusion on this point.

Summary

Two categories of subjects, one with high and the other with low reaction potential (as measured by paper-and-pencil tests of emotional instability, anxiety, and psychopathic tendency) were subjected to frustration in

successive attempts to solve anagrams or arithmetical problems in small groups. Three experiments were conducted, differing only in number of trials, personality types of subjects, and in whether the subjects were observed individually or in groups. The first main prediction, that subjects with higher reaction potential would spend more time on the frustrating tasks than those with lower reaction potential, was not confirmed in any one experiment, although all differences were in the expected direction. The second main prediction was that frustrating trials would produce an initial increase and a subsequent decrease in performance level. The predicted increase was obtained in all three experiments, while the last experiment, the only one designed to provide enough frustration for the decrease to appear, confirmed the second part of the prediction. Groups performed similarly to individuals.

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STRESS AND PSYCHOPATHOLOGY IN STUTTERERS[1]

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PREVIOUS essays from this laboratory (6, 7, 8) have been designed to analyse the expressive end of the communication continuum by selecting stuttered speech as a "model dysplasia" of communication. The present report attempts to define the psychopathological circumstances in which stuttering occurs, to relate this stress to physiological accompaniments of emotional responses in terms of accompanying changes in awareness, and to illustrate how the oximetrically-monitored Controlled Stress Test may be used in an experimental situation.

PROCEDURE

A population of 45 mainly adult stutterers was used. They included 36 males and 9 females, with ages ranging from 11 to 53 and mean age 25.6 years. Two examples of other variants of stammering (cluttering and "hysterical" dyslalia) were also tested. Capillary blood-oxygen saturation was employed as the physiological monitor, and was estimated by the technique of spectroscopic oximetry (13, 5), the site of examination being the finger nailfold skin. The formal mode of the investigation was Series 1 of the Controlled Stress Test (CST), modified as described below.

The Modified CST. Details of the technique of administering this test, its validity and reliability, and illustrations of its use in clinical psychology and psychiatry, have already been reported (10). Series 1 of the CST normally consists of 10 auditory stimuli, of which 5 are "neutral" words (NT) and 5 potentially stressful or "traumatic" (T); to each stimulus word the subject is asked to reply with the first word that comes to his mind. These 10 verbal stimuli are followed by 5 visual stimuli consisting of Rorschach card VI (T) and 4 TAT cards, two of which are neutral (NT) and two potentially stressful (T). As modified for the present investigation, the 5 visual stimuli were dropped and replaced by the additional words: Father, Mother, Boss, Speech, and Tree. The last of these stimuli was a neutral word; the remainder were *a priori* traumatic and were selected in accordance with recent observations concerning the psychopathology of stutterers (16).

RESULTS

Pre-test Oximetric Levels

The mean resting, unstimulated, capillary blood-oxygen saturation of 45 stutterers was found to lie at 95.2 per cent (37.41 R.T. secs.; $\sigma = 5.933$). A slight difference was found between the sexes, the mean for the males being 96.0 per cent (38.44 R.T. secs.; $\sigma = 6.200$) and that for the females

[1]This work was supported by a grant from the Mental Health Division of the Department of National Health and Welfare.

94.9 per cent (34.25 R.T. secs.; $\sigma = 2.773$). This difference was significant ($t = 10.728$; $P < .001$). All the patients were found to be examples of secondary stuttering and were subdivided into "exteriorized" and "interiorized" groups (2).[2] Further subdivision of the exteriorized group yielded "vocalized" and "non-vocalized" types of this variety of stuttering. Table I lists the data and includes samples of fluent controls and neurotics (5) for comparison.

TABLE I

RESTING CAPILLARY BLOOD OXYGEN SATURATION IN CLINICAL VARIETIES OF STUTTERING

Type of stuttering	N	Mean oximetric raw score		Equivalent capillary O_2 satn. (%)
		R.T. secs.	σ	
Exteriorized non-vocal	14	38.500	6.219	96.2
Exteriorized vocal	18	36.944	6.341	95.7
Interiorized	13	37.000	3.397	95.7
Cluttering	1	26.000	—	92.4
Dyslalia, dysphonia	1	27.000	—	92.7
Fluent controls	112	41.143	8.904	96.9
Fluent neurotics	64	37.969	11.178	96.0

Oximetric Response to Apnoeic Stress

The change from the resting level induced by breath holding has been shown (14, 4, 5) to provide an index of homeostatic efficiency in both

TABLE II

STRESS RESPONSE SCORES IN STUTTERERS, NORMALS, AND NEUROTICS

Type of stuttering	N	Mean oximetric stress response score	σ
Exteriorized non-vocal	14	+34.714	12.969
Exteriorized vocal	18	+35.000	18.471
Interiorized	13	+38.200	13.200
Cluttering	1	+35.000	—
Dyslalia	1	+33.000	—
Fluent controls	112	+14.625	10.741
Fluent neurotics	64	− 0.859	11.447

[2]Clinical appraisal of the type of stuttering exhibited by the sample was carried out by Mr. E. Douglass, L.C.S.T., of the Speech Clinic, Department of Psychiatry, University of Toronto.

physical and mental health. A "stress-response score" is obtained by multiplying by 100 the difference between the resting oximetric level and the level obtained after the subject has held his breath for a proportion of his total breath-holding time, and then dividing this figure by the resting level (in R.T. secs.). Negative and low positive ($<+5$) scores are found in physically sick, convalescent, and neurotic patients; high positive scores ($>+25$) in subjects who characteristically over-respond or are hypersensitive to stress, and in paranoid and epileptic patients; while scores of $+5$ to $+20$ are typical of mental and physical health.

Table II suggests that stutterers are extremely hypersensitive to this standardized stress procedure, but that clinical varieties differ little among themselves. It also provides further evidence (7) that stutterers are not neurotics.

The CST in Stuttering

Table III gives the grouped responses of the stutterers to the total CST and to the four additional "traumatic" verbal stimuli. The stressful value of the latter is no longer in doubt. Table IV shows that, when an incidence analysis is made of the verbal responses of the subject to the CST stimuli, stuttering is commoner in response to traumatic words than

TABLE III
STUTTERERS' RESPONSES TO THE MODIFIED CST

CST verbal stimulus	N	Mean oximetric score (R.T. secs.)	σ	Significance of differences
Total neutral group	45	30.133	6.838	
Total stressful group	45	17.289	4.400	$t = 50.18$, $P < .001$
"Father"	45	15.778	4.603	F ratio = 1.962
"Mother"	44	17.432	5.132	$df = 3$ and 172
"Boss"	44	15.432	4.969	P is N.S.
"Speech"	43	17.279	4.390	

TABLE IV
INCIDENCE OF STUTTERED RESPONSES TO CST STIMULI

CST verbal stimuli	Number giving stuttered response	Percentage
"Traumatic" words only	17	37.78
"Neutral" words only	3	6.67
Both	18	40.00
Neither	7	15.56
Total	45	100.01

to the neutral stimuli. Table V translates the CST responses into actual mean capillary blood-oxygen saturations; it suggests that the responses to stressful stimuli involve a definite, if transitory, anoxaemia by comparison with those of non-stuttering controls (10).

Figure 1 breaks down the stutterers' responses to seven traumatic stimuli and shows what percentage of the 45 cases responded with maximal capillary anoxaemia to each stimulus. Table VI, based on the same data, establishes the dominating and fearful figure of the parent of the same sex (of whom "the Boss" is a surrogate) as the most significant concept of the stutterer's psychopathology. (The apparently non-traumatic character of "Mother" in Table VI reflects the fact that only 9 out of 45 subjects were females.)

TABLE V

DEGREE OF CAPILLARY ANOXAEMIA EVOKED BY CST STIMULI

Group	*N*	Oximetric means in percentage O_2 saturation		
		Neutral	Traumatic	Difference
Fluent controls	48	96.9	94.6	−2.3
Fluent neurotics	15	95.6	92.5	−3.1
Secondary stutterers	45	93.6	89.8	−3.8
Clutterer	1	92.4	88.5	−3.9
Dyslalia, dysphonia	1	92.4	88.5	−3.9

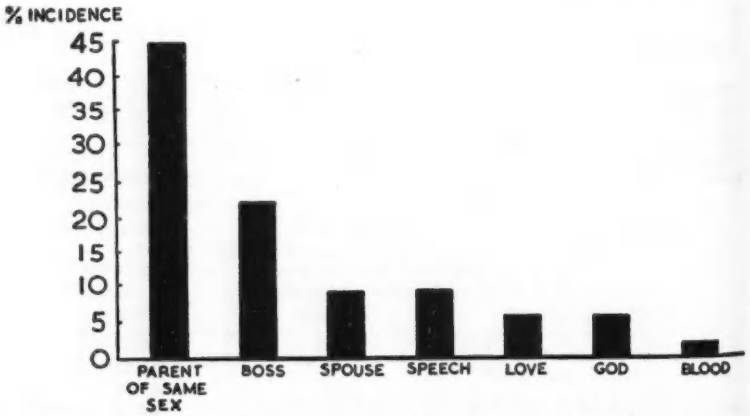

FIGURE 1. Percentages of 45 stutterers responding with maximal capillary anoxaemia to each of 7 traumatic stimuli.

TABLE VI

INFLUENCE OF AUTHORITY FIGURES IN EVOKING ANOXAEMIC RESPONSES IN STUTTERERS

Stimulus	*N*	Mean difference from total (T) raw scores (secs.)	σ	Test of significance	
				t	*P*
Boss	44	−1.727	3.063	3.698	<.001
Father	45	−1.467	2.399	4.056	<.001
Mother	44	+0.159	2.671	0.390	N.S.
Parent of same sex	45	−1.778	2.581	4.569	<.001
Speech	43	−0.256	2.779	0.597	N.S.

DISCUSSION

The investigation of stutterers by the CST technique involves of necessity the entire continuum of a communication system, from perception by the subject of a loaded (because verbal) stimulus to the expression of a response. There is a curious tendency in many workers in this field either to insist (if analytically orientated) that emotion is the be-all and end-all of communication, or (if scientifically orientated) to exclude emotion altogether. The theoretical bio-acoustical systems suggested, for instance, by Davis (1), Peterson (12), and Shannon and Weaver (15), and reviewed and elaborated recently by Fairbanks (3), are homeostatic servo-systems, some of which invoke psychological concepts only tangentially and at the periphery of an otherwise purely mechanistic system of neural pathways.

Emotion is a concept involving psychological (feeling-tone), physiological (autonomico-neuro-endocrinologically mediated) and awareness (visceral perception and appreciation) modalities, each of which is involved in any biological communication procedure. Emotion enters into this system at the time when ideational concept formation is elaborated, following stimulus-perception (6, 9, 10). Considerable evidence exists that the communication dysplasia which stutterers exhibit is by no means confined to the expressive end of this continuum, and other researches from this laboratory suggest that it may be picked up during the processes of cognition (11) and even of perception (8).

The present report seeks to exemplify this dysplasia at the very centre of the communication spectrum, that is, during the processes of emotional envelopment of ideation and concept formation, conflict development, drive tumescence, and conflict resolution. Its findings are explicit and clear-cut: in *psychological* terms, they point to the creation, by perception of the stimulus, of an anxiety which cannot adequately be discharged, and

whose forced incorporation within the organism is accompanied by an increase in emotional (visceral) awareness; in *physiological* terms, they relate to a recurrent disturbance in homeostatic balance, illustrated here by an unstable oxidative metabolism, and characterized by periodic worsening of a chronic relative capillary anoxaemia; in *psychopathological* terms, they relate to a basic and still unresolved emotional conflict of an oedipal nature, involving ambivalent feelings toward the parent of the same sex, or his surrogate.

Summary

(1) A sample of 45 secondary stutterers was investigated by spectroscopic oximetry and by a modified version of the oximetrically monitored Controlled Stress Test (CST).

(2) It was found that stutterers as a group are extremely hypersensitive to a simple breath-holding procedure. Their stress-response scores resemble those of paranoid and epileptic patients rather than those of neurotics.

(3) The subjects tended to stutter their responses to the CST stimuli more when these stimuli were "traumatic" than when they were "neutral." These traumatic stimuli represented a distinct anoxaemic threat.

(4) Capillary anoxaemia was maximal in the stutterer when the phantasied concept of the parent of the same sex (or his surrogate) was invoked as a CST stimulus.

(5) These findings are discussed in terms of their contribution to communication dynamics.

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CONTINUOUS AFFECT RECORDING: RELIABILITY AND VALIDITY[1]

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FEELINGS have usually been investigated as parts of complex psychological processes involving motivational, emotional, perceptual and cognitive components. Thelen (6), however, suggests that a more meaningful measurement of feelings can be obtained when global non-complex categories, such as positive and negative feelings, are used.

Bovard (1, 2,) has developed a method which provides for the continuous recording in permanent form of changes in the feeling of like or dislike of one person for another. An electrically powered affect-recorder is used for the graphical recording of self ratings of these negative and positive affective responses. To avoid the interference of continuous evaluation and registration of feelings with free participation in an interpersonal situation, the method of stimulated recall is used (3). Subjects participate in a verbalized role-playing situation which is wire-recorded. The record is then played back to each subject individually, and he is asked to record his feelings of like or dislike for the other subject while listening to the playback of the original interaction.

The present report describes a methodological test of the reliability and validity of Bovard's method.

METHOD

Subjects. Data were obtained from two separate groups, each of 10 volunteers, 5 male and 5 female. All had some college education or were members of a summer course for teachers. All were strangers to the experimenter. The age of the subjects ranged from 20 to 54 years.

Apparatus. A wire-recorder and an affect-recorder were used. The latter is a continuous graphical recording device driven by an electric motor. The subject records his responses by moving a pointer along a visible scale, calibrated from −5 for extreme dislike, through zero, to +5. A permanent record of his responses is made on moving graph-paper calibrated from 0.0 through 5.0 to 10.0 (to simplify analysis). Hence a negative feeling recorded by the subject as −5.0 is shown on the chart as 0.0, a neutral feeling recorded as 0.0 is shown on the chart as 5.0, and so forth.

Procedure. To test the validity of this method two standard role-playing situations were used, *E* acting the role of a sales manager and *S* that of a salesman (salesgirl).

[1]Based upon a dissertation submitted in partial fulfilment of the requirements for the Master's degree at the University of Toronto. Acknowledgement is made to Drs. E. W. Bovard, Jr., and R. W. B. Jackson for their assistance.

In the *positive* situation S's performance was praised and he was promoted. In the *negative* situation S's behaviour was severely criticized and he was fired. Alternate subjects received positive or negative treatment, and all situations were recorded. The record was played back to the subject as soon as the role-playing situation ended. He then recorded variations in his feelings towards the sales-manager while listening to the play-back.

It was assumed that validity would be indicated if the negatively treated group of subjects scored significantly lower (more in the negative direction) than the positively treated group of subjects. This hypothesis was tested in two independent experiments, using 10 different subjects in each.

To evaluate the reliability of the technique the test-retest method was employed. Affect recordings of a subject were taken while he listened to the play-back of his role-playing situation immediately after his participation in it, and again one week later. The degree of positive correlation between the two records was used as a measure of the reliability of this method. The second group of ten subjects was used in this reliability test.

Treatment of data. Since scores obtained by the use of the affect-recorder are rank-order ordinal scores, the non-parametric median test of significance (4) and the rank-order correlation method were used. Readings were taken from the calibrated graphical record of each subject at five-second intervals. As the chart has 51 calibrations between 0.0 and 10.0, readings were taken with 0.2 accuracy. Hence correlations obtained between any two sets of readings would serve as a rather precise indication of the extent to which the two graphs did or did not vary concomitantly.

Results

Reliability. The test-retest rank-order correlations obtained ranged from −.03 to +.99 as indicated in Table I, all but the −.03 figure being significantly different from zero at the .01 level of confidence. The median of the 10 individual correlations (one for each subject) was +.72. Five of the subjects received the positive and five the negative treatment in the role-playing situation.

TABLE I

Rank Order Correlation Between Test-Retest Scores One Week Apart

Rho	Treatment	Number of readings in each test	p value	Standard deviation of ratings in first test
−.03	−	22	$>.05$	.66
.56	+	24	$<.01$	.74
.59	+	24	$<.01$	1.31
.62	+	24	$<.01$	1.85
.71	−	22	$<.01$	1.56
.73	−	24	$<.01$	1.35
.80	−	24	$<.01$	.40
.82	+	24	$<.01$	.99
.95	−	24	$<.01$	1.67
.99	+	24	$<.01$	1.74

Validity. In the first experiment the combined median affect score of the two groups which received positive and negative treatment was 5.0. As can be seen from the contingency table below there are considerable deviations in each group from the overall median in the direction predicted by the hypothesis ($\chi^2 = 55.4, p < 0.001$).

First validity test	+ *Deviations*	− *Deviations*
Positive treatment	108	32
Negative treatment	46	94

This result was confirmed in the second independent experiment with an equally significant difference ($\chi^2 = 107.7, p < 0.001$). In this second experiment a further validity check was obtained on the subjects' affect recordings made during the second play-back one week later, with comparable significance ($p < 0.001$).

Discussion

Reliability. A median reliability of +.72 is regarded as rather low in a test measuring a relatively enduring characteristic of personality such as intelligence. However, in the measurement of moment to moment variations in feelings of one individual towards another in a two- to three-minute interpersonal situation, this degree of reliability appears acceptable at the present stage of research. Nine out of ten subjects showed a test-retest correlation which was significant at the 1 per cent level. These results, together with the findings that no significant ($p > .05$) shift occurred in the median affect recordings of the two groups over a one-week interval, indicate that the method employed is sufficiently reliable to be used with some confidence in group tests. The rank-order correlation of −.03 obtained from one of the subjects suggests, however, that caution should be used in individual tests pending further findings.

A spuriously high test-retest correlation could be obtained in the case of subjects who simply left the dial untouched. However, this did not occur. A low positive correlation of +.39 was found to exist between the relative magnitudes of the test-retest correlations and the standard deviations of the ratings in the first test. A correlation of this magnitude is not significant at the 5 per cent level of confidence. An inspection of Table I indicates, in fact, that the standard deviations of the ratings of the two subjects who showed the highest test-retest reliability were considerably greater than those of the two subjects who showed the lowest reliability.

General impressions obtained from observation of subjects during the experiment, and from their verbal statements afterwards, suggest that the

greater the intensity of feeling, or "ego-involvement," of the individual in the situation the greater is the reliability of the scores recorded. As the method described above is designed to measure direction of affect only, that is its relative and not its absolute intensity, this possibility could not be tested in this experiment.

Validity. The results of these experiments indicate a satisfactory degree of validity in group measurements. The validity was tested, however, in verbalized situations with strangers. The situations were of such a nature that the subjects were under no necessity to conceal their feelings. Within these limitations, and with subjects of this type (intelligent, non-disturbed adults), the validity appears adequate when a group is used. An analysis of each subject's affect recording (5) suggests a reasonable degree of validity also in individual testing. Of the 20 subjects used in the two experiments, only one obtained a median score which was in a direction contrary to that predicted by the hypothesis. Four subjects registered a median of 5.0. Fifteen subjects out of 20 registered median scores in the directions predicted, that is, above 5.0 after the positive situation and below 5.0 after the negative.

At the conclusion of the experiment each subject was questioned in some detail as to whether he took the experiment seriously, and whether he experienced actual feelings of like or dislike towards the sales manager during the interview situation. This was done before either experimenter or subject looked at the graph. In all cases the oral statements were in substantial agreement with the recordings obtained.

As responses were registered by subjects while listening to a recorded play-back, it can be assumed that this technique is equally valid for the measurement of positive and negative affective reactions while listening to radio performances or to a play-back of a lecture or recorded speech. The technique might also be fruitfully employed in measuring affective reactions of people toward other persons with whom they have close emotional ties, or for recording the responses of maladjusted individuals. In such cases, however, possible tendencies to conceal feelings should be taken into account. It is suggested that for such categories separate validity and reliability standards should be established.

Summary

This paper reports on the reliability and validity of a method devised for the continuous measurement of variations in positive and negative affect. Twenty subjects were used, 10 male and 10 female. Median test-retest reliability was +.72. As regards validity, the median of the affect recordings of a group of subjects receiving negative treatment in a role-

playing situation was significantly lower than the median of a comparable group who received positive treatment.

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ABSTRACT ABILITY IN SCHIZOPHRENIA AND THE ORGANIC PSYCHOSES[1]

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SEVERAL investigators have interpreted impaired performance on tests of abstract ability[2] as indirect evidence of cerebral pathology in schizophrenic patients (2, 4, 8, 14). Such an assumption seems questionable in the light of the studies of Cameron (5) and Hunt (10). They report that, when adequate rapport has been established, even very disorganized schizophrenic patients can be led to generalize quite freely and to shift their mode of attack from one method or category to another. This assertion, if verifiable, argues against an organic basis for schizophrenia, since an organic deficiency cannot be remedied by the momentary establishment of rapport in a patient who prior to, after, and often during, that short period exhibits all the symptoms of a "deteriorated" schizophrenic. In addition to its theoretical implications, the issue is of importance to the therapeutic orientation towards schizophrenia.

The present study was designed to clarify the nature of the behaviour disturbances manifested by schizophrenic patients. It involves a comparison of the performance of schizophrenic patients on the Goldstein-Scheerer Cube Test of Abstract Ability with that of patients suffering from an "organic" psychosis.

PROCEDURE

The Goldstein-Scheerer Cube Test has been found a useful instrument for investigating the behaviour of psychotics (2). Its particular advantage for research in psychopathology is that it utilizes simple, easily recognizable, wooden blocks in a clearly defined situation ("copying" a design). The test lends itself especially well to a study such as the present one in that it allows both quantitative scoring of success at different levels of abstract ability and qualitative behavioural analysis.

Boyd (3) has shown that performance on the Goldstein-Scheerer Cube Test is related to intelligence. Hunt and Cofer (11, p. 973) emphasize the importance of age in loss of intellectual efficiency. Since the "organic" groups, particularly those with General Paresis, are usually considerably older than the "functional" groups, age should be controlled in any comparison of these two groups. In addition, the increasing rigidity of thought processes generally attributed to aging makes control of the age factor particularly important in an investigation of performance on such

[1]Based upon a dissertation submitted in partial fulfilment of the requirements for the Master's degree at the University of Toronto.

[2]The "abstract attitude" is held to occur when an individual goes beyond the specific aspects or sense impressions and responds to the individual thing as representative of a category or class (9, p. 575).

a test as the Goldstein-Scheerer, where success is directly related to flexibility of approach. In this study, steps were taken to control both intelligence and age.

Twenty randomly selected neuropathological patients with irreversible brain disease were matched, for age and pre-psychotic intelligence, with twenty psychiatrically diagnosed schizophrenics, selected solely on the basis of these matching factors of age and intelligence. Matching was done individually, limits being arbitrarily set at no more than 5 years difference in age, and no more than 10 IQ points difference in intelligence. The age range of the organic group was 20–48 ($M = 40.4$, $SD = 5.94$); of the schizophrenic group 25–50 ($M = 40.5$, $SD = 5.97$). None of the patients studied was undergoing either shock or fever therapy. The IQ range of the organic group was 73–128 ($M = 95.9$, $SD = 16.63$); of the schizophrenics 77–128 ($M = 96.4$, $SD = 14.07$).

To assess the pre-psychotic level of intelligence the Wechsler-Bellevue Vocabulary was administered to each patient, and by prorating, an IQ was derived. While this measure is far from satisfactory, it is, as Babcock (1) has shown, the best available with psychotic patients for whom inadequate educational records are available.

When matching had been completed, the Goldstein-Scheerer Cube Test was administered to each of the 40 patients in the manner outlined by the authors (9, pp. 49–53). Quantitative scores were derived in accordance with Boyd's scoring system (3, pp. 150–152). A record was kept of the observed behaviour and verbalizations of each patient during the test situation. In order to analyse these records a number of qualitative signs or "categories" were empirically derived and each patient's record was classified in terms of these qualitative categories. This made it possible to determine the number of patients in each group who showed evidence of each type of qualitative behaviour. When this had been done, those qualitative categories which were equally distributed in both groups were eliminated. Those categories which were present in only one group, or appeared more frequently in one group than in the other, were retained.

When tested for significance as suggested by McNemar (12), six categories of qualitative performance were found to differentiate "organic" performance from schizophrenic performance at various levels of probability. These are described below.

Differentiating Categories

1. *Flap.* This type of behaviour is characterized by an emotional state which results in maladaptive activity on the test. The objective (copying the design) is retained, but the efforts to attain the objective are poorly directed. The commonest types of maladaptive behaviour in "flap" are:

(*a*) Numerous, rapid, random and repetitious placements of blocks without adequate testing for correctness, e.g., correct placements may be made and immediately changed because the patient does not take time to consider the relationship of the placement to the objective;

(*b*) Substitution of one block for another when the desired colour is not visible on the block at hand, e.g., the patient looking for a red component will, when the red side is not uppermost on the block at hand, substitute another block even though all the blocks are the same. (The patient who is not manifesting "flap" behaviour turns the block at hand until the desired side is uppermost.)[3]

[3]Goldstein and Scheerer assume that persons with cerebral pathology behave in this manner because they lack understanding of the principle of equivalence. However, it was observed in the present study that patients made use of the principle of equivalence until a "flap reaction" was elicited; this makes Goldstein and Scheerer's explanation questionable.

2. *Face-saving behaviour.* This type of behaviour may take the form of:

(*a*) Excuses, e.g., "My head aches," "I never had much schooling," when difficulty is encountered;

(*b*) Aggressive behaviour toward the examiner. The formerly friendly and co-operative patient, when encountering difficulty, directs a verbal tirade against the examiner or the test, e.g., "You damn fool, why do you want me to do this kid stuff?"

3. *Use of concrete devices.* This class of behaviour is distinct from the use of the concrete devices which the test formally allows (the gradation of each test design from abstract to concrete) and takes the following forms:

(*a*) Moving in close to the design card. The patient may move his block design in to the base of the design card or even onto the card itself in an attempt to get "closer" to the design. He appears to feel that distance from the card increases the difficulty of copying the design.

(*b*) The patient may try to utilize tactual cues, e.g., he feels the design card with his fingers; or he may continuously repeat aloud the colours he needs, as though afraid of forgetting them, e.g. he keeps repeating aloud, as rapidly as possible, "Red and white, red and white, I want red and white."

4. *Seeks reassurance.* The patient continually seeks reassurance from the examiner that each move he makes is correct. Characteristic is the question, "Is that right?" after each placement of a block. He may verbalize a lack of confidence in his ability, even when doing well.

5. *Proud and pleased with correct solution.* This category was scored when the patient gave evidence of an almost infantile jubilance when the design was correctly copied. To be scored, it had to be accompanied by some such verbal expression as "I'm getting real cute at this." Actions alone were not accepted as justifying a score in this category.

6. *Masked pleasure.* This category differs from 5 in that the patient represses his pleasure, making definite attempts to deny it, and often making excuses for his success.

Results

Quantitative

The performance of the schizophrenic group was generally superior to that of the organic group.

(*a*) Treating the groups as wholes, there was a statistically significant difference ($CR = 3.35$, $P < .01$) in the Goldstein-Scheerer scores of 34 points in favour of the schizophrenic group (schizophrenic mean = 88.8; organic mean = 54.8). The *SD*s of these means are 35.2 and 26.8 for the schizophrenic and organic group, respectively, indicating greater variability of performance within the schizophrenic group.

(*b*) The quantitative results for matched pairs further demonstrate the general superiority of the schizophrenics. In 14 of the pairs (70 per cent), the Goldstein-Scheerer scores of the schizophrenics were superior to those of the organic patients with whom they were matched. They were inferior in 6 pairs. This difference also is significant statistically ($CR = 2.7$, $P < .01$).

In three of the six pairs in which organic patients were superior, the schizophrenic patients were apparently lacking in motivation to perform well. Two of the three literally left the field; one, after having completed six designs with no trouble, quietly said, "that's enough," got up and left; the other, when she found that the examiner was not going to bring her chocolates, refused to continue. No organic patient showed this type of behaviour.

Qualitative

Some revealing differences were also found in the qualitative aspects of the Goldstein-Scheerer performance (Table I).

TABLE I

COMPARATIVE PERCENTAGES OF PATIENTS IN THE SCHIZOPHRENIC AND THE ORGANIC GROUPS WHO EXHIBITED BEHAVIOUR OF CATEGORIES 1–6

Category	Schizophrenic (%)	Organics (%)	D_p	*CR*	*P*
1	0	100	100	6.3	0.0001
2	35	55	20	1.32	0.17
3	10	55	45	4.3	0.0001
4*	0	35	35	—	—
5*	0	25	25	—	—
6*	20	0	20	—	—

*Because *qNs* is less than 5 it is unsafe to compare the two groups by the $D/\sigma D$ technique (12, p. 77).

The most convincing difference was with respect to Category 1 (flap reaction). None of the members of the schizophrenic group showed any evidence of flap; all 20 members of the organic group manifested flap reaction at some time in the test performance. The flap reaction in organics occurred in stress situations, that is, when difficulty was encountered. Its occurrence was devastating to the patient's test performance. Individuals who proceeded rapidly and efficiently when the designs presented no difficulty were quite unable to complete the design when some difficulty resulted in a flap reaction.

Category 2 (face-saving behaviour) was less diagnostic, but Category 3 (use of concrete devices) differentiated the groups sharply. Eleven (55 per cent) of the organic patients used or attempted to use this type of aid, while only two of the schizophrenics showed any behaviour which could be classified under this heading.

Category 4 (seeks reassurance) occurred in only seven cases, all organics; Category 5 (proud and pleased with correct solution) in only five cases, again all organics.

The one form of qualitative behaviour found only in schizophrenic patients was Category 6 (masked pleasure) which occurred in four members (20 per cent) of that group. While this number is small, the fact that none of the organic group gave any evidence of this type of behaviour makes its presence (with this group at least) pathognomonic of schizophrenia. Its absence, of course, cannot be construed as indicating organic pathology.

Discussion

From these results it is apparent that the schizophrenics of this study exhibited very few forms of behaviour in their test performance which could be considered as "characteristic of schizophrenia." Apart from the "masked pleasure" displayed by four schizophrenic patients, none of the qualitative categories could be interpreted as being more common to schizophrenic than to organic patients. Although the schizophrenics displayed, in the clinical situation, many of the distinctive signs frequently described as part of the nosological picture (**6**, pp. 890–891), their test performance was devoid of any consistent behaviour which might be developed into a "typical" schizophrenic picture.

On the other hand, the superior performance of the schizophrenic group implies an ability to concentrate which their general ward activity (or lack of activity) denies. For chronic schizophrenics, who are hallucinating, delusional, and "broken down" in every usual sense of the term, to perform well on the Goldstein-Scheerer makes the conception of the schizophrenic as being incapable of interest in his surroundings seem hardly tenable. This generally superior test performance supports the view that schizophrenia is not a loss or serious impairment of abstract ability, but rather a "defect of motivation," as postulated by Cameron (**6**), and Hunt (**10**).

The behaviour of the organic group, on the other hand, permits the delineation of an "organic picture" of performance on the Goldstein-Scheerer, the predominant theme of which is a strong desire to do well superimposed on an impaired intellectual ability. The over-concern with doing well often interferes detrimentally with the patient's performance. This basic theme is here suggested as the underlying force in the behaviour of the organic patient on the Goldstein-Scheerer. From an analysis of their qualitative behaviour the following description emerges: The organic patient, performing on the Goldstein-Scheerer test, may exhibit a childish pride and pleasure in success; he may seek reasssurance from the examiner before and after each move he makes; he will frequently seek assistance from the use of concrete devices beyond those called for by the test; he will frequently resort to face-saving behaviour;

and he will always (considering the 20 patients in this sample as representative), give evidence of flap in stress situations. It should be mentioned that some of these categories (face-saving behaviour, use of concrete devices) may also occur in schizophrenics. However, they are more frequent in organic than in schizophrenic patients, and, when they occur in combination with the other behaviour reactions mentioned, may be considered indicative of organic pathology rather than schizophrenia.

The strong desire to do well, postulated above as the dominant force in the test performance of the organic patient, seems applicable to each of the categories described as occurring or likely to occur in his test behaviour. In view of this strong desire to do well, the generally inferior performance of these patients may be attributed to impaired ability resulting from the brain lesions.

The strong emotionality displayed throughout the test performances of the organic group suggests that the "organic" psychoses may be explainable, at least in part, as a reaction to the frustration engendered by the lowered efficiency resulting from the brain lesion. The brain lesion makes impossible many activities which were previously within the patient's ability. His past achievement, in his pre-lesion days, has provided standards for his present goals. The lowered level of ability prevents the maintenance of these standards, with resultant frustration. Stated in terms of Rosenzweig's general frustration theory, this "phenomenon of deprivation, following a period of satisfaction, introduces factors not encountered in other types of frustration or privation" (13, p. 382). The brain-lesion patient's performance falls short of his previous standards, with consequent insult to his ego. The result is maladaptive attempts to protect the ego, and these, in extreme form, constitute the "organic psychosis." Again Rosenzweig's general frustration theory seems applicable: "When psychological constancy cannot be achieved in more adequate ways, less adequate ones are adopted" (13, p. 384).

This theory is supported by the numerous forms of behaviour manifested by the "organic psychotic." The variability of the clinical picture is rarely a matter of the type or location of the lesion (7, p. 553). It is due, rather, to the particular form which the reaction to frustration takes in each individual, a form which may be considered an expression of his personality structure. If the lesion itself were the cause of the psychosis, there would be a degree of uniformity in the psychotic reaction which, in fact, does not exist. From this point of view the variations in severity of psychosis, which cannot be completely accounted for by the extent of the lesions, are explainable in terms of individual differences in the capacity to resist or compensate for the resultant inability. In frustration theory, this is the individual's "frustration tolerance."

Such an emphasis on the part played by frustration in the organic psychoses has important therapeutic implications. Since the frustration is a result of discrepancies between previously developed standards and present impaired ability, a lowering of the patient's aspiration level to a point commensurate with his lowered ability should reduce or eliminate the frustration. With this realistic realignment of aspiration level, the ego will not be subject to the stresses and strains which had previously led to the psychotic reaction.

Implementation of such a reeducational program would involve the controlled presentation to the patient of tasks within his scope but at a level of difficulty which would develop in him a set toward learning as a process continuing throughout his life. Keeping the level of difficulty within the patient's scope would avoid the emotionality resulting from inability; making the tasks tax the patient's abilities would develop his interest and foster a desirable attitude toward learning.

Summary

The Goldstein-Scheerer Cube Test of Abstract Ability was administered to 20 organic and 20 schizophrenic mental hospital patients, matched on the basis of age and Wechsler-Bellevue Vocabulary intelligence ratings. Group performances were compared quantitatively and qualitatively in an attempt to clarify the nature of the loss of efficiency found in both organic and schizophrenic psychoses. The chief findings were:

1. Performance of the schizophrenic group was significantly superior to that of the organic group.

2. Schizophrenics whose performance was inferior to that of the organic patients with whom they were matched were inferred to be poorly motivated.

3. Performance of the schizophrenic patients showed no characteristic pattern.

4. Performance of the organic patients was generally characterized by evidence of impaired ability accompanied by over-concern with doing well, emotionality in stress situations, and consequent reduction of efficiency.

In view of the high emotionality apparent in the performance of organic patients, it is suggested that the "organic psychoses" may be in part explained as a reaction to frustration engendered by the lowered efficiency resulting from the brain lesions. An appropriate reeducation program for organic patients is outlined.

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ADMINISTRATIVE SET AND SEX DIFFERENCES AS FACTORS IN THE NEGATIVE SELF-CONCEPT SCORE

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In line with recent attempts to formulate a personality theory using the self concept as a focal construct (**12, 14, 15**) the past several years have witnessed the development of at least five techniques (**1, 5, 6, 7, 11**) purportedly measuring some type of self-regarding attitude. Basically, each of these devices is a variant of the traditional paper and pencil inventory, and thus subject to criticism on ground of superficiality and possible falsification (**9**). Many investigators, aware of the transparency of these instruments, have sought to derive from them measures which would be minimally influenced by the subject's knowledge of the socially acceptable response.

One approach to this problem has involved the use of self-concept discrepancy scores. Here the subject is asked to make a series of self ratings from multiple frames of reference. For example, one may compare his rating of himself on a given trait with how he would like to score on it ideally (**5**), or compare his "best true rating," giving himself the benefit of every doubt, with his "poorest true rating," denying himself any such benefits (**6**). Such investigations focus on the discrepancies between self ratings made from the various frames of reference, rather than on their absolute levels; thus the problem of falsification of direct self ratings is in part evaded. Using the Brownfain rating scale (**6**), for example, a subject's actual belief may be that on Variable X he merits a rating of 5 when given the benefit of any doubt ("positive self concept") and of 2 when denied this benefit ("negative self concept"). But, feeling that these ratings look rather low, he may upgrade them "protectively" to 8 and 5, respectively. In this instance, while his absolute ratings differ from the way he really feels about himself, the discrepancy between positive and negative ratings is 3 in either case. Some data have been presented to support the validity of the self-concept discrepancy score as a discriminating personality index, in terms of other measures (**4, 5, 7, 13**). However, in several instances findings have been equivocal or in a direction opposite to that predicted (**2, 3**).

A second approach to the identification of a discriminating self-concept index within the framework of the available transparent inventories involves utilization of a more subtle absolute rating, of a type less likely to mobilize typical test-taking defences. In a recent exploratory study (**8**) subjects who had taken the Brownfain inventory were divided into ex-

CANAD. J. PSYCHOL., 1956, 10 (1)

treme high and low groups on the basis of their negative self-concept scores, and these groups were compared on other measures. In general, the high scorers were found to have more favourable self-regarding attitudes, on another independent measure, and to be less predisposed toward authoritarian thinking than were the low scorers. A second sample duplicated the findings obtained with the first. That the discriminatory power of the negative self-concept measure extends beyond the criterion inventory measures used in this study is suggested by the findings of LaFon (**10**), who reports Rorschach differences (consistent with prediction) between high and low negative self-concept scorers.

An *ad hoc* explanation of Cowen's findings was proposed as follows:

> It is conceivable that a S, when asked to make multiple ratings about himself as in the present study, may be inclined to relax his defences more for an apparently innocuous rating such as the negative self concept than he would for the more traditional defence-mobilizing type of rating. Thus the poorest rating that a person admits to on an inventory of this type may actually be the closest approximation to the way he actually feels about himself (**8**, p. 141).

Inherent in such an explanation is the belief that the discriminating quality of the negative self-concept measure, under the testing conditions used, derives from the fact that it is embedded in a series of self ratings in such a way as minimally to arouse test-taking defences. On the basis of this *post facto* explanation, the following prediction was made:

> Where this measure (negative self concept) is given alone, its falsification proneness should increase, whereas when it is given as one of a series of ratings, its falsification proneness should decrease. Significantly higher scores might therefore be expected in the "alone" as compared to the "embedded" conditions of administration (**8**, p. 141).

The general purpose of the present investigation is to compare the negative self-concept scores under two administrative conditions: first, where it is one of a series of self ratings made for certain trait-descriptive variables ("embedded" condition); and second, where it is the only self rating index used ("alone" condition). We expect that the latter condition is more defence-mobilizing, and should therefore predispose the subject to greater falsification. Consequently we predict that test scores should be significantly higher under the "alone" condition.

We propose also to examine sex differences in negative self-concept scores under both conditions. If falsification is operating in the "alone" situation, it may conceivably operate differentially for the two sexes.

Procedure

Sixty-six male and female undergraduates in an advanced psychology course were given, in group administration, a Brownfain self-rating inventory, modified as described earlier (**8**). Papers were not signed. The subjects rated 25 personality descriptive

terms, along 11-point rating scales, for both positive and negative self concept ("embedded" condition). The items rated were as follows: (1) intelligence, (2) emotional maturity, (3) general culture, (4) social poise, (5) physical attractiveness, (6) neatness, (7) sociability, (8) generosity, (9) manners, (10) cheerfulness, (11) consistency, (12) sincerity, (13) initiative, (14) trustfulness, (15) flexibility, (16) sportsmanship, (17) individuality, (18) interest in opposite sex, (19) self understanding, (20) dependability, (21) understanding of others, (22) self acceptance, (23) popularity, (24) prestige, (25) overall adjustment.

The pertinent portions of the instructions for this condition read as follows:

"You are asked to make two ratings for each descriptive term. The first of these ratings should indicate *how you would rate yourself on this variable if you deliberately gave yourself the benefit of any doubt*, and the second rating should indicate the opposite (i.e., *a self-critical rating in which you do not give yourself the benefit of the doubt*). It should be understood that both of these ratings will be true ratings. The difference between them will reflect the fact that it is possible to make different ratings on a single item, depending on whether or not an individual is giving himself the benefit of the doubt."

Some time later, 44 additional male and female undergraduates, selected from the following semester's enrolment in the same course, were given the same inventory in group administration, but were asked to make ratings in terms of the negative self concept only ("alone" condition). The pertinent instructions were as follows:

"The individual could make different but still 'true' ratings depending on whether or not he tried to give himself the benefit of the doubt, deny himself every benefit of the doubt, or compromise between these alternatives. To reduce such possible ambiguities we would like you to make *one* highly specific rating for each descriptive term. This we may refer to as a *self-critical rating in which you do not give yourself the benefit of the doubt*. This is nevertheless a 'true' rating in the sense that it reflects your best judgment of your own standing with respect to a given attribute, when you deny yourself the benefit of a reasonable doubt."

After these subjects had completed the inventory, they were shown copies of the exact instructions used for the "embedded" administration, and were asked to guess whether their negative selfratings would have been higher, lower, or the same as the ones they had just filled out, had they responded to the inventory under the embedded condition.

Results and Discussion

Administrative Set

For the "embedded" condition, the mean total negative self-concept score was 147.1 with a sigma of 23.3; comparable figures for the "alone" condition were 183.0 and 23.1. A test of the significance of the differences between the means yielded a t value of 7.86, significant beyond the .001 level, while the computed F ratio demonstrated approximately homogeneous variance between groups. Thus the original hypothesis, that higher negative self-concept scores would be obtained in the "alone" than in the "embedded" test condition, is confirmed by these data.

Since the instructions for the negative self-concept ratings were

essentially identical in the two situations, the marked differences in self ratings may be attributed to the different contexts in which they were made. In the "alone" condition only one rating is made, so that any protective upgrading which occurs must affect that single rating. In the "embedded" condition, since the subject has another rating which he may alter if so motivated, he may be less defensive with regard to the negative self concept, and may respond in a manner more consistent with his true feelings about himself. Thus the apparent discriminatory power of the negative self concept observed in earlier experiments (8, 10) may be largely due to the fact that the ratings obtained under the embedded conditions of those experiments were reasonably accurate ones.[1]

It seems desirable to extend the present study to more complex types of embedded conditions, so as to identify situations in which defensive test-taking behaviour may be further minimized. Such an approach, while aimed specifically toward the improvement of available devices for measuring self-regarding attitudes, might well have implications for increasing the validity of paper and pencil inventories in general.

At the completion of the "alone" administration, the subjects were shown the instructions for the "embedded" situation, and asked whether, if these had been followed, their ratings would have been higher, lower, or the same as those that they had just made. They responded as follows: same: 15; higher: 3; lower: 26; the distribution departing from chance expectancy, as measured by a chi-square test, at beyond the .001 confidence level. These data suggest that, notwithstanding emphasis on the need for honesty and accuracy in the instructions, the subjects were generally aware of the likelihood of some upward distortion of ratings in the "alone" administration. (Since these estimates were made after self-rating had been completed, they in no way influenced the data secured.)

Sex Differences

When scores of male and female subjects were compared, no significant or near-significant differences were found between group means or variances of total negative self-concept scores under either condition.

In the "embedded" condition, males scored higher than females on

[1]The fact that negative self-concept scores are higher or lower in one or another condition need not *per se* be a revealing datum. The crucial test concerns the relative differentiating power of scores obtained under the two conditions. Inherent both in the present line of reasoning and in that of the preceding study (8) is the notion that discrimination would be considerably higher using scores obtained in the "embedded" condition. This hypothesis should be subjected to experimental test.

No. 11, "consistency," ($p = .05$); as this was the only significant difference found for the 25 items, it may be attributed to chance.

In the "alone" condition, differences between means of the two sexes were significant ($p < .05$) for 4 of the 25 items. These are shown in Table I, together with items on which p was .20 or less.

Males rate themselves significantly higher than females on interest in opposite sex, popularity, and prestige, while females rate themselves higher on sincerity. Although the differences may in part reflect a capitalization upon chance, and require additional cross-validation, they suggest lines of research which may be profitable in the future. If (as we have proposed) the "alone" setting is conducive to falsification, this technique may provide valuable information, not only about differential modes of distortion in male and female subjects, but also about the relation of such distortion to cultural stereotypes and expectancies.

TABLE I

SEX DIFFERENCES IN NEGATIVE SELF RATINGS UNDER "ALONE" CONDITION

Item	Title	Means		Diff. between means	t† ($df = 39$)	p‡
		Male ($N = 23$)*	Female ($N = 18$)			
2	Emotional maturity	7.91	7.17	.74	1.345	.20
3	General culture	7.35	8.11	−.76	1.948	.07
12	Sincerity	7.74	8.72	−.98	2.390	.03
13	Initiative	6.65	7.61	−.96	1.687	.10
18	Int. in opp. sex	8.65	7.44	1.21	2.051	.05
19	Self understanding	7.61	6.83	.78	1.418	.20
23	Popularity	7.17	6.22	.95	2.375	.03
24	Prestige	7.00	6.11	.89	2.342	.03

*Three of the 44 subjects failed to identify their sex; hence the total N of 41.

†All F ratios indicated approximate homogeneity of variance.

‡Both tails of the t distribution were used in determining the tabled p values.

SUMMARY

Two groups of college undergraduates completed Brownfain-type negative self-concept ratings under two different administrative conditions. One group made these ratings along with positive self-concept ratings ("embedded" condition), while the second made only the negative self-concept ratings ("alone" condition). As predicted, negative self-concept scores were significantly higher in the latter group. These differences are attributed largely to the falsification potential of the "alone" condition.

Total negative self-concept scores showed no sex differences under either test condition. With respect to individual items, there were no sex differences in the "embedded" test condition; indications of such differences were found in the "alone" condition, but require cross-validation. The findings are discussed, and suggestions made for further work.

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BOOK REVIEWS

Clinical Versus Statistical Prediction. By Paul E. Meehl. Minneapolis: Univer. of Minnesota Press, 1954. Pp. x, 149. $3.00.

It is always a healthy sign when serious and flexible-thinking individuals in the profession re-evaluate their own and fellow psychologists' activities. Meehl, a respected learning theorist and a competent clinician, critically examines the current functions of clinical psychologists in prognosis, diagnosis, and therapy. He is primarily concerned with the problem of "clinical" versus "statistical" methods of prediction and the implications of the empirical findings on this issue for the profession of clinical psychology. The empirical problem is a straightforward one: Does a clinician better an actuarial table in predicting how an individual will act in a given situation? Unfortunately, an unambiguous answer cannot be given to this question.

Before reviewing the available studies on this issue, Meehl emphasizes the importance of the issue, makes some clarifying distinctions between the validating and analytic use of statistics, and between the source or type of data utilized and the manner in which the data are combined for purposes of prediction. In addition, he discusses critically and thoughtfully Sarbin's theoretical argument concerning clinical prediction and includes an illuminating discussion on the nature of clinical work. When Meehl arrives at the discussion of the empirical evidence on the issue, one is surprised to find the complete absence of any comprehensive and well-designed study in this area. Although he was able to locate some twenty studies on the issue, most of them have some weaknesses in experimental design and deal only with the prediction of such criteria as university grades, success in training programmes, recidivism and recovery from psychoses. Meehl's final tally of the results indicates that in about one-half of the studies the two methods are about equal in predictive efficiency and that the clinician is poorer than the statistical clerk in the other half. In the light of such evidence, Meehl leans towards the conclusion that the clinician can spend his time more profitably doing research or therapy than in attempting clinical predictions or in formulating a dynamic picture of a patient for diagnostic purposes.

While this little book is an excellent one, some questions may be raised over the treatment of certain problems. When one considers Eysenck's recent review of the literature on the results of therapy, there is room for doubt about Meehl's contention that the clinician would be more successful in psychotherapy than in prediction. In spite of Meehl's optimism concerning therapy, some psychologists would endorse the cynical state-

ment that therapists have their greatest and only successes with patients who have spontaneous remission of their symptoms. Meehl's attempt to contrast the Reichenbachian and Carnapian views of probability seems far too sketchy to be meaningfully understood by most readers. One also wonders if Meehl is correct when he argues that the formation of a wrong hypothesis in therapy results only in loss of time. It seems reasonable to suggest that the exploration of a wrong hypothesis may actually interfere with the successful continuance of therapy.

In sum, this book provides a highly stimulating and impartial treatment of a complex problem. There is much in it that can be read with profit by clinical and actuarial psychologists. Certainly, it will stir up much controversy and it may lead to some profitable changes in clinical work. Moreover, it should stimulate research on the clinical-actuarial issue.

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Fundamentals of Psychoanalytic Technique. By TRYGVE BRAATØY. New York: John Wiley & Sons, Inc. (Toronto: Univer. of Toronto Press), 1954. Pp. xi, 404. $6.00.

IN *Fundamentals of Psychoanalytic Technique*, Trygve Braatøy writes with enthusiasm about patients and therapists. It is refreshing to be instructed by an author who is willing to discuss his therapeutic failures with his successes, and who has the capacity to view his profession as *a* method of psychological treatment and not necessarily as *the* method.

The book is directed primarily towards analysts in training, but it should interest all who are engaged in psychological treatment. The author, assuming the reader to be acquainted with Freudian theory, deals with what goes on during analytic sessions. He is a man of positive convictions and speaks his mind freely; his critical candor being softened, however, by an overriding concern for his patients, and more remarkably, for his colleagues! A recurrent theme is the value of non-verbal techniques and cues to aid the patient in catharsis and the analyst in understanding. Time and again the author turns to the patient's present behaviour as the touchstone for treatment. The doctrinaire analyst who imposes a therapeutic pattern on the patient before he has adequately adjusted himself to the patient's natural means and tempo of self-expression as well as his immediate problems, may effectively stall progress and be responsible for a long-term therapeutic failure. Frequently, the author believes, analysts are too exclusively psychological in their orientation. Historically this is thought attributable to Freud's chilly medical reception, which

resulted in a swing away from the comprehensive diagnostic and therapeutic resources of clinical medicine. The treatment of patients is not confined to verbal and emotional interplay, but includes the physician's responsibility for physical symptoms, either as presented or as generated by the analysis.

The contents of the book are arranged in a temporal sequence, including such matters as the emotions of the analyst as he approaches the patient, professional differences in therapeutic orientation, risks in undertaking treatment, responsibility for the patient (included here is an interesting discussion of the responsibility of the lay analyst *versus* the medical therapist), and finally a section on the science of interpretation. The author seldom hesitates to digress if the spirit moves him—relating psychoanalysis to other professions, commenting upon the idiosyncracies of his colleagues, even suggesting how Franz Alexander might better have treated one of his analysands.

The reader will not necessarily agree with all that Braatøy has to say, but he will respect the author's fairness in presentation and the breadth and depth of his therapeutic experience. This is not likely to be viewed as a great book, since new theories are not presented nor are large areas of psychoanalytic thought systematized. Nevertheless it may mark a new stage in the maturity of psychoanalytic writing—a departure from the tightly spun case history to prove a theoretical point, or the implicit assumption that all psychiatry was nought before the light of Freud's star entered the firmament.

This volume will not appeal to every psychologist. Its place in teaching is at the graduate level, more specifically in clinical courses which involve counselling or psychotherapy. It would be especially helpful to the teacher who wishes to give his students a critical insight into analytic therapy as distinct from theory, and yet does not wish to encourage his protégés to indulge in amateur analytic therapy.

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Human Behaviour in the Concentration Camp. By ELIE A. COHEN (trans. by M. H. Braaksma). Toronto: Clarke, Irwin & Co., Ltd., 1954. Pp. xvi, 295. $3.75.

THE AUTHOR, a Dutch physician, spent 31 months in concentration camps, 16 of them in Auschwitz, where his entire family was put to death on arrival. He offers here a Freudian explanation of the behaviour of prisoners and guards, as reflected in his own experiences and in the 147 works referred to.

His book is a deeply disturbing one. First because of the facts it contains, facts set out as calmly as census data. Of 11,172 people transported from Holland to Auschwitz in two months of 1942, 29 returned alive; 2,500,000 Jews were gassed in the camp between May, 1940, and December, 1943; 1,300,000 more during 1944. These things are as "true" as the results of the last election, and yet we do not really believe them. Cohen gives us the full supporting detail from the Nuremberg files: the technical advantages of prussic acid over carbon monoxide, as seen by Commandant Hoess; the trying difficulties faced by the staff in fulfilling their quotas during inclement weather; the 99,922 children's garments sent from Auschwitz to Germany in December, 1944. Have we forgotten these things in ten years, or repressed them? And what are the implications of such ready forgetfulness?

Another disturbing section is that devoted to the Schutzstaffel (SS) who manned the camps. Here again Cohen is completely objective, stating that if the same educational system—authoritarianism plus Nazi ideology—obtained elsewhere, other nationalities would act similarly. Whatever we may think of his views on the mutability of the superego, this persuasive chapter should turn every sensitive reader into a ruthless enemy of authoritarianism.

Cohen's observations of his own and others' behaviour shows us, in more detail than Bettelheim did, what human beings become under unbelievable pressures of starvation, brutality, and constant expectation of death. It is not a pretty picture; little but the basic survival-drives is left. The non-Freudian may find the author's explanations speculative, but every psychologist will profit from this close look at human beings stripped of almost all that socialization gives them. If our subsequent reflections are sombre, we may gain encouragement from the fact that the author, although reduced during his imprisonment to the same primitive state as his fellows, has now been able to write this book, so objective, so fair, so devoid of hatred or self-pity. Such qualities may indeed be learned accretions, but it is clear that, in a normal social climate, they become intrinsic properties of the individual, no less human and natural than the egotism they deny.

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VOL. 17, NO. 5

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